

Department copy

B.Sc 15-16

ETHIRAJ COLLEGE FOR WOMEN
PG DEPARTMENT OF BIOCHEMISTRY
SYLLABUS
FOR
B.Sc BIOCHEMISTRY
UNDER CHOICE BASED CREDIT SYSTEM
(2015-2016)

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS)

CHENNAI-600008

PG DEPARTMENT OF BIOCHEMISTRY

MINUTES OF THE BOARD OF STUDIES MEETING

B.Sc BIOCHEMISTRY

The Board of Studies meeting for revision of syllabus with effect from 2015 was held in the Department of Biochemistry on 16.03.2016. The following changes and additions suggested in the UG curricula have been implemented in the new curriculum.

- Topics on units of concentration were included and topics on detailed applications of spectroscopic techniques were deleted in the paper Biophysical and Biochemical Techniques.
- The topic high energy compounds were included in the paper Intermediary Metabolism.
- Reorganisation of topics in the units was carried out in the paper Immunology.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS)

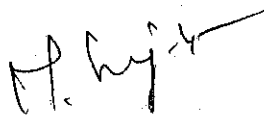
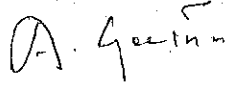
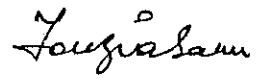
CHENNAI- 600008

PG DEPARTMENT OF BIOCHEMISTRY

BOARD OF STUDIES MEETING – B.Sc BIOCHEMISTRY

The Board of Studies meeting was held in the department of biochemistry on 16.03.2016.

The Board consisted of the following members.

| S.NO | MEMBER'S NAME & DESIGNATION | SIGNATURE |
|------|---|--|
| 1. | Dr.M. SUJATHA (CHAIRMAN BOARD OF STUDIES) HEAD DEPARTMENT OF BIOCHEMISTRY ETHIRAJ COLLEGE FOR WOMEN CHENNAI -600008 |  |
| 2. | Dr. A. GEETHA (UNIVERSITY NOMINEE) HEAD DEPARTMENT OF BIOCHEMISTRY BHARATHI WOMEN'S COLLEGE CHENNAI-108 |  Dr. A. Geetha Ph.D., Head & Associate Professor Department of Biochemistry Bharathi Women's College Chennai - 600 108 |
| 3. | Dr. FOUZIA BANU (SUBJECT EXPERT) HEAD DEPARTMENT OF BIOCHEMISTRY JUSTICE BASHEER AHMED SAYEED COLLEGE FOR WOMEN CHENNAI -18 |  HEAD OF THE DEPARTMENT OF BIOCHEMISTRY, J.B.A.S. COLLEGE FOR WOMEN (AUTONOMOUS), CHENNAI - 600 018 |

4. Dr. P.T. SRINIVASAN (SUBJECT EXPERT)
HEAD
DEPARTMENT OF BIOCHEMISTRY
D.G.VAISHNAV COLLEGE
CHENNAI -106

P.T. Srinivasan
Dr.P.T.Srinivasan,
MSc(BC),PhD, MA (P&R), MSc (BI),MA (Tamil)
Head, Dept. of Biochemistry
Dwaraka Doss Goverdhan Doss Vaishnav College,
833, EVR Periyar Road, Arumbakkam Ch-106.

5. Dr.A. K.HEMANTH KUMAR (INDUSTRIAL REPRESENTATIVE)
SCIENTIST -C
DEPARTMENT OF BIOCHEMISTRY
NATIONAL INSTITUTE FOR RESEARCH IN TUBERCULOSIS
CHETPET
CHENNAI

A.K. Hemanth Kumar
Dr. A.K. HEMANTH KUMAR, M.Sc.,B.L.,Ph.D.
Scientist 'C' & Chairman, Legal Cell
Biochemistry and Clinical Pharmacology
National Institute for Research in Tuberculosis
Indian Council of Medical Research
Chetpet, Chennai - 600 031

6. Dr. S. VIJAYALATHA
ASSISTANT PROFESSOR
DEPARTMENT OF BIOCHEMISTRY
ETHIRAJ COLLEGE FOR WOMEN
CHENNAI 600008

S. Vijayalatha

7. Mrs. J. PRIYA
ASSISTANT PROFESSOR
DEPARTMENT OF BIOCHEMISTRY
ETHIRAJ COLLEGE FOR WOMEN
CHENNAI 600008

J. Priya

8. Ms. VIJAYASHAKILA (ALUMNA)
M.Sc Batch (2013-2015)

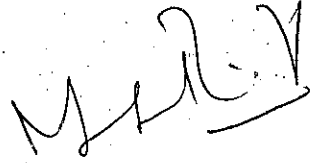
M. Vijayashakila

Dr. V. MALATHI

ASSISTANT PROFESSOR

DEPARTMENT OF BIO CHEMISTRY

ETHIRAJ COLLEGE FOR WOMEN

A handwritten signature in black ink, appearing to read 'V. Malathi', is written in the upper right quadrant of the page. The signature is stylized and includes a horizontal line underneath the name.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS)

CHENNAI- 600008

PG DEPARTMENT OF BIOCHEMISTRY

B.Sc BIOCHEMISTRY - REVISED SYLLABUS EFFECTIVE FROM 2015-16

• **PREAMBLE**

The PG Department of Biochemistry is revising syllabi with effect from the academic year 2015-16 with existing CBCS and part IV and Part V components as specified by the government of Tamil Nadu.

Part IV and Part V components will seek to build the capacity of the students and provide inputs for his or her social service and social analysis capabilities.

Every academic year is divided into 2 semester sessions. Each semester will have a minimum of 90 working days and each day will have 5 working hours. Teaching is organized into a modular pattern of credit courses. Credit is normally related to the number of hours a teacher teaches a particular subject. It is also related to the number of hours a student spends learning a subject or carrying out an activity.

• **REGULATIONS**

1. Eligibility for admission:

Candidates for admission to the first year of the U.G Biochemistry degree course shall be required to have passed the higher secondary examinations conducted by the Government of Tamil Nadu or an examination accepted as equivalent there to by the syndicate of the University of Madras with chemistry and biology/botany,zoology/biochemistry as one of the science subjects .

2. Eligibility for the award of degree:The candidate shall be eligible for the award of the degree only if he /she have undergone the prescribed course of the study for the period of not less than 3 academic years, passed the examinations of all the 6 semesters prescribed.

3. Course of the study :

- Part I : Tamil / other languages
- Part II : English
- Part III: Core subjects, Allied subjects
- Part IV : Non Major Elective (1a, 1b, 1c)
- Soft Skill
- Environmental studies
- Value Education
- Part V : Extension Activity.

4. Passing minimum :

A candidate shall be declared to have passed in each paper /practical of the main subject of study where ever prescribed, if she secured NOT LESS THAN 40 % of the marks prescribed for the examination.

5. Classification of successful candidates :

Part I, II, III, IV

Successful candidates passing the examination and securing the marks

- 60 % and above , 50% and above but below 60 % in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class respectively
 - All other successful candidates shall be declared to have passed the examination in the THIRD CLASS.
- Candidates who pass all the examinations (Part I, II, III, IV) prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for ranking.

6. Question paper pattern :

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

Template for Evaluation Pattern

| Semester | Course Code | Course Title | Continuous assessment | | | | |
|----------|--|--------------|-----------------------|---------|--|------------------------|-------|
| | | | Test I | Test II | Seminars /Quiz/Assignment /Field Visit | Participatory Learning | Total |
| I | Cell Biology | BC15/1C/CEL | 10 | 10 | 10 | 10 | 40 |
| I | Allied Chemistry I | BC15/1A/ CY1 | 10 | 10 | 10 | 10 | 40 |
| II | Biomolecules | BC15/2C/BIM | 10 | 10 | 10 | 10 | 40 |
| II | Allied Chemistry II | BC15/2A/ CY2 | 10 | 10 | 10 | 10 | 40 |
| III | Biophysical & Biochemical techniques | BC15/3C/BPT | 10 | 10 | 10 | 10 | 40 |
| IV | Enzymes | BC15/4C/EZY | 10 | 10 | 10 | 10 | 40 |
| V | Intermediary Metabolism I | BC15/5C/IN1 | 10 | 10 | 10 | 10 | 40 |
| V | Intermediary Metabolism II | BC15/5C/IN2 | 10 | 10 | 10 | 10 | 40 |
| V | Clinical Biochemistry | BC15/5C/CLI | 10 | 10 | 10 | 10 | 40 |
| V | Physiology | BC15/5C/PHS | 10 | 10 | 10 | 10 | 40 |
| V | Elective- Bioinstrumentation & Biostatistics | BC15/5E/BIB | 10 | 10 | 10 | 10 | 40 |
| VI | Molecular Biology | BC15/6C/MOL | 10 | 10 | 10 | 10 | 40 |
| VI | Genetics | BC15/6C/GTS | 10 | 10 | 10 | 10 | 40 |
| VI | Biotechnology | BC15/6C/BTG | 10 | 10 | 10 | 10 | 40 |
| VI | Elective- Basics of Bioinformatics | BC15/6E/BOB | 10 | 10 | 10 | 10 | 40 |
| VI | Elective- Immunology | BC15/6E/IMG | 10 | 10 | 10 | 10 | 40 |

ALLIED PAPERS OFFERED FOR OTHER DEPARTMENTS

| Semester | Course Code | Course Title | Continuous assessment | | | | |
|----------|--|--------------|-----------------------|---------|--|------------------------|-------|
| | | | Test I | Test II | Seminars /Quiz/Assignment /Field Visit | Participatory Learning | Total |
| I | + Allied Biochemistry-I | BC15/1A/BC1 | 10 | 10 | 10 | 10 | 40 |
| II | + Allied Biochemistry-II | BC15/2A/BC2 | 10 | 10 | 10 | 10 | 40 |
| I | + Allied Basic Chemistry -I | BC15/1A/CH1 | 10 | 10 | 10 | 10 | 40 |
| II | + Allied Basic Chemistry-II | BC15/2A/CH2 | 10 | 10 | 10 | 10 | 40 |

EVALUATION PATTERN FOR CONTINUOUS ASSESSMENT

| | | | |
|--------------------------------------|------|----------|-----------------|
| Test I | 2hrs | 50 marks | 10marks |
| TestII | 2hrs | 50marks | 10marks |
| Quiz/Assignment/Semester/Field visit | | | 10marks |
| Participatory Learning | | | <u>10marks</u> |
| Total | | | <u>40 marks</u> |

RUBRICS FOR CONTINUOUS ASSESSMENT EVALUATION.

- Assignment -Contents/originality/Presentation /Schematic representation and Diagram/Bibliography. (10marks)
- Seminar-Organisation/subject knowledge/Visual Aids/Confidence level/Presentation.(10marks)
- Participatory learning-Answering questions/Clearing doubts/Participation in discussion /Attendance /Communication and language.(10marks)

PG DEPARTMENT OF BIOCHEMISTRY

REVISED SYLLABUS OF JUNE 2015

SEMESTER I

| S.no | Semester | Course title | Course code | Hours | Credits | CA marks | End semester | Total |
|------|----------|--|-------------|-------|---------|----------|--------------|-------|
| 1 | I | Language | | 5 | 3 | 40 | 60 | 100 |
| 2 | I | English | | 5 | 3 | 40 | 60 | 100 |
| 3 | I | Major- Cell Biology | BC15/1C/CEL | 7 | 5 | 40 | 60 | 100 |
| 4 | I | Allied Chemistry I | BC15/1A/CY1 | 4 | 4 | 40 | 60 | 100 |
| 5 | I | Major Practical I | BC15/2C/PR1 | 3 | | | | |
| 6 | I | Allied Chemistry Practical I | BC15/2A/CPR | 2 | | | | |
| 7 | I | Non Major Elective (NME) (1a/1b/1c) | | 2 | 2 | - | 50 | 50 |
| 8 | I | Soft Skill | | 2 | 3 | - | 50 | 50 |

SEMESTER II

| S.no | Semester | Course title | Course code | Hours | Credits | CA marks | End semester | Total |
|------|----------|---------------------------------|-------------|-------|---------|----------|--------------|-------|
| 1 | II | Language | | 5 | 3 | 40 | 60 | 100 |
| 2 | II | English | | 5 | 3 | 40 | 60 | 100 |
| 3 | II | Major – Biomolecules | BC15/2C/BIM | 7 | 5 | 40 | 60 | 100 |
| 4 | II | Allied Chemistry – II | BC15/2A/CY2 | 4 | 4 | 40 | 60 | 100 |
| 5 | II | Major Practical I | BC15/2C/PR1 | 3 | 3 | 40 | 60 | 100 |
| 6 | II | Allied Chemistry Practical I | BC15/2A/CPR | 2 | 2 | 40 | 60 | 100 |
| 7 | II | NME (1a/1b/1c) | | 2 | 2 | - | 50 | 50 |
| 8 | II | Soft Skill | | 2 | 3 | - | 50 | 50 |

SEMESTER - III

| S.no | Semester | Course title | Course code | Hrs | Credits | CA marks | End semester | Total |
|------|----------|---|-------------|-----|---------|----------|--------------|-------|
| | III | Language | - | 5 | 3 | 40 | 60 | 100 |
| | III | English | - | 5 | 3 | 40 | 60 | 100 |
| | III | Major- Biophysical & Biochemical techniques | BC15/3C/BPT | 7 | 5 | 40 | 60 | 100 |
| | III | Allied Microbiology I | MB15/3A/AM1 | 4 | 4 | 40 | 60 | 100 |
| | III | Major Practical II | BC15/4C/PR2 | 3 | - | - | - | - |
| | III | Allied Microbiology Practical | MB15/4A/PR2 | 2 | - | - | - | - |
| | III | Soft skill | - | 2 | 3 | - | 50 | 50 |
| | III | Environmental studies | - | 2 | 2 | - | 50 | 50 |

SEMESTER - IV

| S.no | Semester | Course title | Course code | Hours | Credits | CA marks | End semester | Total |
|------|----------|-------------------------------|-------------|-------|---------|----------|--------------|-------|
| 1 | IV | Language | - | 5 | 3 | 40 | 60 | 100 |
| 2 | IV | English | - | 5 | 3 | 40 | 60 | 100 |
| 3 | IV | Major-Enzymes | BC15/4C/EZY | 7 | 5 | 40 | 60 | 100 |
| 4 | IV | Allied Microbiology II | MB15/4A/AM2 | 4 | 4 | 40 | 60 | 100 |
| 5 | IV | Major Practical II | BC15/4C/PR2 | 3 | 3 | 40 | 60 | 100 |
| 6 | IV | Allied Microbiology Practical | MB15/4A/PR2 | 2 | 2 | 40 | 60 | 100 |
| 7 | IV | Soft skill | | 2 | 3 | - | 50 | 50 |
| 8 | IV | Value Education | - | 2 | 2 | - | 50 | 50 |

The above Courses of the UG program enrich the skills in employability / skill development / Entrepreneurship which cater the needs of the Students

SEMESTER - V

| S.no | Semester | Course title | Course code | Hrs | Credits | CA marks | End semester | Total |
|------|----------|---|-------------|-----|---------|----------|--------------|-------|
| 1. | V | Major - Intermediary Metabolism-I | BC15/5C/IN1 | 4 | 4 | 40 | 60 | 100 |
| 2. | V | Major - Intermediary Metabolism-II | BC15/5C/IN2 | 4 | 4 | 40 | 60 | 100 |
| 3. | V | Major -Clinical Biochemistry | BC15/5C/CLI | 4 | 4 | 40 | 60 | 100 |
| 4. | V | Major - Physiology | BC15/5C/PHS | 4 | 4 | 40 | 60 | 100 |
| 5. | V | Elective - Bioinstrumentation & Biostatistics | BC15/5E/BIB | 5 | 5 | 40 | 60 | 100 |
| 6. | V | Major practical- III | BC15/6C/PR3 | 4 | - | - | - | - |
| 7. | V | Major practical- IV | BC15/6C/PR4 | 5 | - | - | - | - |

SEMESTER - VI

| S.no | Semester | Course title | Course code | Hrs | Credits | CA marks | End semester | Total |
|------|----------|--|-------------|-----|---------|----------|--------------|-------|
| 1. | VI | Major - Molecular Biology | BC15/6C/MOL | 4 | 4 | 40 | 60 | 100 |
| 2. | VI | Major - Genetics | BC15/6C/GTS | 4 | 4 | 40 | 60 | 100 |
| 3. | VI | Major - Biotechnology | BC15/6C/BTG | 4 | 4 | 40 | 60 | 100 |
| 4. | VI | Elective- Basics of bioinformatics | BC15/6E/BOB | 5 | 5 | 40 | 60 | 100 |
| 5. | VI | Elective - Immunology | BC15/6E/IMG | 5 | 5 | 40 | 60 | 100 |
| 6. | VI | Major practical- III | BC15/6C/PR3 | 4 | 3 | 40 | 40 | 100 |
| 7. | VI | Major practical- IV | BC15/6C/PR4 | 4 | 3 | 60 | 60 | 100 |

ALLIED PAPERS OFFERED FOR I B. Sc MICROBIOLOGY

| S.No | SEM | COURSE TITLE | COURSE CODE | HOURS/ WEEK | CREDITS | CA MARKS | END SEM MARKS | TOTAL |
|------|------|-------------------------------|-------------|-------------|---------|----------|---------------|-------|
| 1 | I | Allied Biochemistry -I | BC15/1A/BC1 | 4 | 4 | 40 | 60 | 100 |
| 2 | II | Allied Biochemistry -II | BC15/2A/BC2 | 4 | 4 | 40 | 60 | 100 |
| 3 | I&II | Allied Biochemistry Practical | BC15/2A/BPR | 2 | 2 | 40 | 60 | 100 |

ALLIED PAPERS OFFERED FOR I B. Sc CLINICAL NUTRITION AND DIETETICS

| S.No | SEM | COURSE TITLE | COURSE CODE | HOURS/ WEEK | CREDITS | CA MARKS | END SEM MARKS | TOTAL |
|------|------|----------------------------|-------------|-------------|---------|----------|---------------|-------|
| 1 | I | Allied Basic Chemistry -I | BC15/1A/CH1 | 4 | 4 | 40 | 60 | 100 |
| 2 | II | Allied Basic Chemistry -II | BC15/2A/CH2 | 4 | 4 | 40 | 60 | 100 |
| 3 | I&II | Allied Chemistry Practical | BC15/2A/CPR | 2 | 2 | 40 | 60 | 100 |

NME (1c) SUBJECT FOR OTHER DEPARTMENTS

| S.No | SEM | COURSE TITLE | COURSE CODE | HOURS / WEEK | CREDITS | CA MARKS | END SEM MARKS | TOTAL |
|------|-----|--|-------------|--------------|---------|----------|---------------|-------|
| 1 | I | Yoga and Diet for Health | BC15/1N/YAD | 2 | 3 | - | 50 | 50 |
| 2 | II | Life Style Diseases In Women | BC15/2N/LSD | 2 | 3 | - | 50 | 50 |

SEMESTER I
CELL BIOLOGY

TEACHING HOURS: 105

Credits: 5

COURSE CODE : BC15/1C/CEL

LTP : 5 2 0

OBJECTIVE

1. The Structure & functions of Cell and Cell organelles
2. Different cell types and Tools of cell biology.

COURSE OUTLINE

UNIT I:

(21hrs)

The cell and cell organelles : Prokaryotic cell, Eukaryotic cell-Plant cell, Animal cell, cytoskeleton microtubules and microtubullar organization. Endomembrane system - Endoplasmic reticulum, Golgi complex, Membrane organelles – Mitochondria, Chloroplast, Lysosome, Peroxisomes and Glyoxisomes and Nucleus.

UNIT II:

(21hrs)

Cell membrane transport: Chemical composition of cell membrane, model of cell membrane – sandwich model, fluid mosaic model, Membrane transport: Passive transport – Osmosis and diffusion, Active transport, Bulk transport – exocytosis, phagocytosis and endocytosis. Cell boundries: Cell coat, cell wall – Structure, composition and function

UNIT III:

(21hrs)

Cell types and function: Epithelial cell – simple and compound, Muscle cell – Skeletal, cardiac, smooth muscle cells. Nerve cell, Immune cell - T&B cell, Gametes- Sperm, Ovum, Cancer cell. Differentiation of cell surface – Invagination, Microvilli, Basement membrane, Tight junction, Desmosome, Gap junction Extracellular matrix-Collagen, Hyaluron

UNIT IV:

(21hrs)

Cell division: Cell cycle, Mitosis, significance of mitosis, Meiosis – kinds of meiosis and significance of meiosis. Cell death: Overview of programmed cell death-Apoptosis & Necrosis. Significance of apoptosis and necrosis. Cell renewal: stem cells-Embryonic stemcell, adult stem cell.

UNIT V:

(21hrs)

Tools of cell biology: Microscopy, Basic principles and applications of light microscopy, phase contrast microscopy, electron microscopy. Cell slicing-role of microtome. Staining technique- Haemotoxylin and eosin staining. Cell culture technique-Animal cell, Plant cell.

Recommended Books:

1. Cell biology, Genetics, Molecular Biology, Evolution and Ecology-
Dr.P.S.Verma, Dr.V.K.Agarwal, V , S.Chand and Company Pvt.Ltd.
2. Cell Biology-Chanarayappa, Universities Press.
3. Cell and Molecular Biology-Praghya khanna, I.K International publishing House Pvt.Ltd.

Reference Book:

1. World of cell –Becker VII edition, Gr Publisher, <http://www.igbooks.com> - Free Online Library
2. The Cell –Molecular approach (III edition)-Geofery M Cooper, Sinauer Associates

Journals:

1. International journal of cell biology-Openaccess
2. European journal of Cell biology – Elsevier
3. The international journal of Biochemistry & cell biology-Elsevier

Online source:

1. www.biology.arizona.edu/cell_bio/cell_bio.html
2. www.cellbiology.yale.edu
3. www.cellbio.com

Question paper pattern:

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER - I
ALLIED CHEMISTRY - I
(For I B.Sc Biochemistry)

TEACHING HOURS: 60

CREDITS: 4

COURSE CODE: BC15/1A/CY1

LTP : 3 1 0

OBJECTIVES: To have an understanding of the fundamental aspects of theoretical and practical chemistry.

COURSE OUTLINE

UNIT I: (12 HRS)

I a. Chemical bonding- Definition- Types of bonds - Formation of different bonds with examples --Ionic bond – NaCl, KCl-Covalent bond- Single bond- H₂S,HCl, Multiple bond – N₂ , O₂--Coordinate bond –Hydronium ion, ammonium ion--Hydrogen bond – Inter and Intra molecular Hydrogen bonding e.g. O & P Nitro phenol-- Vanderwaals force.

I b. Shapes of molecules – VSEPR Theory & Hybridization CH₄, H₂O, NH₃, BrF₃,SF₆, IF₅, IF₇.

UNIT II: (12 HRS)

Mechanistic basis of organic reactions – Definition of substrates – Electrophiles , Nucleophiles – Elementary treatments of Substitution reactions SN₁ , SN₂ Walden inversion - Aromatic Electrophilic substitution (Nitration, sulphonation) - Elimination Reaction- E₁ , E₂ Hoffmann and saytzeff rule- Addition Reaction – Markonikoff's rule and Kharash effect.

UNIT III: (12 HRS)

Electrolytes and non electrolytes examples (strong & weak electrolytes) Difference between metallic conductors and electrolytic conductors – conductance – definition , electrical conductivity – specific conductivity – equivalent conductivity – molar conductivity - relationship between equivalent and molar conductivity – effect of dilution on conductance , Ostwald's dilution law – Kohlraush's law and its application.

UNIT IV: (12 HRS)

Acids and bases – Arrhenius concept- Bronsted-Lowry concept- conjugate acids and bases – Lewis concept Concept of pH and pOH – Determination of pH using potentiometric method (pH meter) –Buffer examples for acidic and basic buffer – Buffer action – Biological applications of buffers.

UNIT V (12 HRS)

Volumetric analysis – Advantages of Volumetric analysis over other quantitative analysis – Preparation of solutions – Primary and Secondary Standards – (examples) – Definition of

Mole, Molarity, Molality, Normality, Formality Dilution – Difference between end point, equivalence point - Types of volumetric analysis – Acidimetry and Alkalimetry – Examples & Indicators used Strong acid Vs Strong base, Strong acid Vs Weak base, Weak acid Vs Strong acid, Weak acid Vs Weak base – Redox Titrations – Permanganometry, Dichrometry, Iodometry, Iodimetry – Complexometry – EDTA Titrations.

RECOMMENDED TEXTBOOKS

1. Allied Chemistry-Gopalan and Sundaram, 3rd edition
2. Text Book of Allied Chemistry-Dr. V. Veeraiyan et al, Highmount Publishing House

REFERENCE BOOKS

1. Modern Inorganic Chemistry-R.D. Madan
2. Organic Chemistry-P.L. Soni
3. Principles of physical chemistry-Puri and Sharma

JOURNALS

1. Journal of Chemistry – open Access
2. Asian journal of Chemistry
3. Rasayan journal of Chemistry=open access
4. Journal of chemical education – ACS publication
5. www.asiajournalofchemistry.co.in
6. rasayanjournal.co.in
7. pubs.acs.org

WEBSITES

<http://www.chemistry.org>

<http://www.chemhelper.com>

Question paper pattern:

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER II

BIOMOLECULES

TEACHING HOURS: 105

COURSE CODE: BC15/2C/BIM

CREDITS: 5

LTP : 5 2 0

OBJECTIVE:

1. To enable the students understand the structure of biomolecules.
2. To study the biological significance of the biomolecules.

COURSE OUTLINE

UNIT 1:

(21 hours)

Carbohydrates – Classification, Biological functions, Optical Isomerism and Geometric Isomerism of Sugars, Van't Hoff rule, Anomeric Forms. Haworth structure of Mono saccharides (Glucose, Fructose), Disaccharides (Lactose, Sucrose), mutarotation, racemic mixture, Polysaccharides - Homopolysaccharides (Starch, Glycogen), Hetero polysaccharides.- Mucopolysaccharides (Heparin, Chondroitin sulphate).

UNIT II:

(21 hours)

Amino acids – Zwitter ion, amphoteric nature, peptide bond, Classification and Structure based on composition of side chain. Essential and non-essential amino acids. Proteins – Classification based on solubility, shape, composition and functions. Properties of proteins – Denaturation and renaturation. Protein Structure – primary, secondary. Forces stabilizing protein structure. Tertiary structure (example myoglobin), Quaternary Structure of Hemoglobin

UNIT III:

(21 hours)

Lipids- Definition and Bloors classification, Biomedical importance of lipids, Types of Fatty acids-saturated, unsaturated, cyclic fatty acids, Essential fatty acids-its functions, triglycerides. Chemical characterization of fats- iodine value, saponification value, acid number, R_m value, rancidity.

UNIT IV:

(21 hours)

Phospholipids-structure and biological functions of lecithins, cephalins, phosphatidyl serine, plasmalogens, glycolipids, cholesterol, bile acids and bile salts.

UNIT V:

(21 hours)

Nature of genetic material, components of nucleic acid-structure of nucleosides, nucleotides, cyclic nucleotides-AMP, GMP. Size and structure of different types of DNA-A,B and Z. Structure and role of different types of RNA- mRNA, rRNA, tRNA, Heterogenous nuclear RNA. Denaturation and annealing of DNA.

BOOKS RECOMMENDED:

1. Text book of biochemistry – JL Jain.
2. Text book of biochemistry -U.Satyanarayana

REFERENCE BOOKS:

1. Biochemistry – Stryer,4th edition
2. Principles of biochemistry – Lehninger (Second Edition)

JOURNALS:

1. Journal of Biomolecules=Open access
2. International journal of Biological macromolecules-Elsvier
3. Journal of Biomolecules- Wiley

WEB SITE:

www.phschool.com/science/biology_place/

www.nios.ac.in/media/documents/313courseE/L31.pdf

Question paper pattern:

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER – II

ALLIED CHEMISTRY – II

(For I B.Sc Biochemistry)

TEACHING HOURS: 60

CREDITS: 4

COURSE CODE: BC15/2A/CY2

LTP : 3 1 0

OBJECTIVES : To enable students to understand the co-ordination, Industrial and drug chemistry and its application in daily life.

UNIT I:

(12 Hrs)

Co-ordination Chemistry – Difference between Double salt and Co-ordination Compounds. Nomenclature Werner's theory, Definition and Biological importance of Chelates – Haemoglobin, Application of chelates – medicinal and analytical –Determination of hardness of water and softening of water.

UNIT II:

(12 Hrs)

Industrial Chemistry – Fuels, Classification, Fuel Gas – natural gas, Water gas, Semi water gas, Carbureted Water gas, Producer gas, Oil gas, Gobar gas and LPG- Composition and uses. Silicones – Preparation, properties and uses. Synthetic Dyes – Classification of Dyes, Azo, Triphenylmethane, Vat and Mordant Dyes and their preparation.

UNIT III:

(12 Hrs)

Drug Chemistry – Classification of drugs, Preparation and Properties of Sulpha drugs, Sulpha pyridine, Prontosil, Sulpha diazine and Sulpha furazole. Mode of action of Sulpha drugs.

Antibiotics – Penicillin, Chloramphenicol. Definition, example each for analgesics, antipyretics, tranquillizers, sedatives, hypnotics, local and general anaesthetics.

UNIT IV:

(12 Hrs)

Electrochemistry – electro motive force, measurement of emf using oxygen, calomel, quinhydrone electrodes. Single electrode potential – standard hydrogen electrode, electrochemical series and its uses. Thermodynamic concept of electrode potential (Nernst equation).

UNIT V:

(12 Hrs)

Isolation and Purification of Organic Compounds – Extraction, Differential extraction, Distillation, Fractional distillation, Steam distillation Crystallization, Sublimation, Separation Technique – Chromatography – Paper, TLC and Column.

RECOMMENDED TEXTBOOKS

1. Allied Chemistry-Gopalan and Sundaram, 3rd edition
2. Text Book of Allied Chemistry-Dr.V.Veeraiyan et al,Highmount Publishing House

REFERENCE BOOKS

1. Modern Inorganic Chemistry-R.D.Madan
2. Organic Chemistry-P.L.Soni
3. Principles of physical chemistry-Puri and Sharma

JOURNALS:

1. Biochemistry-ACS publication
2. Biochemical journal
3. Pubs.acs.org

WEBSITES

<http://www.chemistry.org>

<http://www.chemhelper.com>

Question paper pattern:

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PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER I & II
MAJOR PRACTICAL I

TEACHING HOURS: 90

CODE: BC15/2C/PR 1

CREDITS: 3

LTP: 0 0 3

1. Identification of prepared slides

- a. Epithelial cell-squamous, cuboidal, columnar, ciliated
- b. Cardiac muscle cell, skeletal muscle cell, smooth muscle cell

2. Models or pictures of cell organelle and cell junction

- a. Mitochondria,
- b. Nucleus,
- c. Tight junction
- d. Gap junction

slides

3. Qualitative Analysis of carbohydrates:

~~Reactions of sugars like~~

Monosaccharides : Glucose, Fructose

Disaccharides : Sucrose, Maltose

Polysaccharides : Starch, Dextrin

5. Qualitative Analysis of amino acids:

Tyrosine, Tryptophan, Cysteine and Arginine.

6. Qualitative analysis of lipids:

7. Preparations

Preparation of starch from potato

Preparation of casein from milk

Isolation of DNA from spleen

SEMESTER I & II

ALLIED CHEMISTRY PRACTICAL

(for I B.Sc Biochemistry & I B.Sc CND)

TEACHING HOURS: 60

CREDITS: 2

COURSE CODE : BC15/2A/CPR

LTP: 0 0 2

VOLUMETRIC ANALYSIS

- 1) Estimation of HCl using Standard Oxalic Acid.
- 2) Estimation of Borax – Standard Sodium Carbonate.
- 3) Estimation of Ferrous Sulphate – Standard Mohr Salt Solution.
- 4) Estimation of Oxalic Acid – Standard Ferrous Sulphate.
- 5) Estimation of Ferrous Ion – Diphenylamine Indicator.
- 6) Estimation of Zinc Using EDTA – Standard Magnesium Sulphate.

ORGANIC SUBSTANCE ANALYSIS:

Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests.

- 7) Reaction of Aldehyde (Aromatic).
- 8) Reaction of Carbohydrates.
- 9) Reaction of Carboxylic Acid (Mono & Di).
- 10) Reaction of Phenol.
- 11) Reaction of Amine (Aromatic, primary).
- 12) Reaction of Amide (Mono & Di).
- 13) Reaction of Ketone (not for exam)

SEMESTER III

BIOPHYSICAL AND BIOCHEMICAL TECHNIQUES

TEACHING HOURS: 105 HRS

CREDITS : 5

COURSE CODE: BC15/3C/BPT

LT P : 5:2:0

OBJECTIVES: To facilitate students to gain knowledge about technique to effectively carry out practical procedure and research projects.

COURSE OUTLINE

Unit – I

(21hrs)

Units of concentration – Normality, Molarity and Molality. Colloidal solutions- Introduction, types of Dispersion phase (DP) & Dispersion medium (DM). Tyndal effect, Ultrafiltration- biological significance. Donon membrane equilibrium.

Viscosity , surface tension, and Osmotic pressure – definition , determination and biological significance

Unit – II

(21hrs)

Chromatographic techniques – general principles of Chromatography, principles, operational procedures and applications of Paper, Thin layer, Gel permeation, Ion exchange , Affinity and Gas liquid chromatography.

Types of radioactive emission, half life , units of radioactivity. Detection and measurement of radioactivity- methods based on ionization (GM counter), excitation (Scintillation counter). Applications of radioisotopes in the elucidation of metabolic pathways and radio dating.

Unit – III

(21hrs)

Electrophoretic techniques , general principle , factors affecting migration rate- electric field , buffer , supporting medium. Electrophoretic mobility of samples. Paper, celluloseacetate, agarose , gel electrophoresis, PAGE and SDS- Page .

Principles of Electrophoretic techniques, measurement of pH by Glass electrode, pH of buffer solutions, biological buffers.

Unit –IV

(21hrs)

Centrifugation techniques: basic principle of centrifugation, rotors, types of centrifugation- Preparative and Analytical. Differential , Density gradient, Isopycnic , Rate zonal centrifugation

technique. Analytical ultra centrifugation , Application of Centrifugal techniques with special reference to determination of molecular weight of Macromolecules.

Unit – V

(21hrs)

Basic principles of Electromagnetic radiation – energy , wavelength , wave number and frequency. Absorption and Emission Spectra .Beer Lambert law , Absorbance and Transmittance. Colorimetry – Principle , Instrumentation and application. UV Spectrophotometry - Principle and Instrumentation. Spectrofluimetry- Principle, Instrumentation and applications (Estimation of Thiamine).

Recommended text books

1. Practical Biochemistry (V Edition)- Keith Wilson & John Walker, Cambridge University pres
2. Biophysical chemistry – Debajyothi Das

Reference Books

1. Practical Biochemistry – Randhir Singh and Sawhney
2. Instrumental methods of Chemical analysis- Chatwal Anand , Himalaya Publishing House

Journals

1. Biophysical journal-cell
2. Biophysical journal-Elsvier
3. Journal of Biochemical&Biophysical Methods-Elsvier

Website

www.freebookcentre.net/./Biochemical_Techniques.

www.cell.com

www.journals.elsevier.com

Question paper pattern:

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER – IV

ENZYMES

TEACHING HOURS: 75 HOURS

CREDITS: 5

COURSE CODE: BC15/4C/EZY

L T P: 5 2 0

OBJECTIVES:

1. To learn in detail about the enzymes, classification and kinetic properties.
2. To understand the mechanism of action, purification and applications of enzymes in different fields.

COURSE OUTLINE

Unit I:

(15 hrs)

Rate of reaction, standard free energy, activation energy, chemical equilibrium in biological context, enzymes as biocatalyst.

Definitions- Apoenzyme, holoenzyme, cofactors- Metal cofactors, coenzymes. Role of NAD, TPP, PLP. Active site – definition, characteristic features, Enzyme specificity.

Unit II:

(15 hrs)

Classification of enzymes according to International Union of Biochemistry Convention 1964 (E.C upto 2nd digit). Factors influencing enzyme activity – pH, temperature, substrate, product, modulators (Activators, inhibitors), ES complex formation, lock and key model and induced fit model, Enzyme units- IU & Katal

Unit III:

(15 hrs)

Enzyme Kinetics- Michaelis Menten equation and its derivation, significance of K_m and V_{max} , Line weaver burk plot and Eadie- Hofstee plot, enzyme inhibition- competitive (with applications), Non- competitive, Uncompetitive – Derivations not included.

Allosteric inhibition, simple sequential model, conserted model, feedback inhibition with example.

Unit IV:

(15 hrs)

Extraction of enzymes – Nature of the extraction medium, extraction of soluble enzymes, techniquis for enzyme isolation, separation of cellular organelles by differential centrifugation, intracellular localization of enzymes and marker enzymes.

Unit V:**(15 hrs)**

Purification of enzymes- Dialysis, chromatography, electrophoresis- Criteria of purity of enzymes.

Designer enzymes – Ribozymes ,abzymes. Multienzyme complex - pyruvate dehydrogenase complex. Definition – Isoenzymes, zymogens and Immobilised enzymes.

Recommended Books:

1. Enzyme Kinetics (1995) – Palmer, London: Portland Press
2. Enzyme Kinetics - Dixon , 1972, wiley publishers
3. Fundamental of Enzymology – Price & Steven , 1999-Bowker company

Reference Books:

1. Fundamentals of Enzymology - Nicholas C.Price and Lewis Stevens., Oxford University Press, New Delhi.
2. Principles of Biochemistry - 4th edition - Lehninger, Nelson and Cox, 2005, WH Freeman and Company, New York, USA.

Journals:

1. Enzyme Research
2. Enzyme and Microbial Technology - Journal

Websites:

1. www.lsbu.ac.uk/biology/enztech/
2. www.lsbu.ac.uk/biology/enzyme/

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SEMESTER – III & IV
MAJOR PRACTICAL- II

TEACHING HOURS: 90 HOURS

CREDITS: 3

COURSE CODE:BC15/4C/PR2

L T P: 0 0 3

I. Titration

1. Estimation of Glycine
2. Estimation of Iron
3. Estimation of Copper
4. Estimation of Glucose by Benedicts method
5. Estimation of Ascorbic acid
6. Determination of Iodine number
7. Determination of Acid number
8. Estimation of Calcium in milk (Group)

II. Preparation of buffers- Phosphate buffer, Tris buffer

III. Demo Experiments

1. Separation of Aminoacids by paper chromatography
2. Separation of Lipids by thin layer chromatography
3. Separation of Plant pigments by column chromatography
4. Separation of Proteins by SDS – PAGE

SEMESTER V

INTERMEDIARY METABOLISM I

TEACHING HOURS: 60

CREDITS: 4

COURSE CODE: BC15/5C/INI

L T P : 4 0 0

OBJECTIVE:

To enable the student to have an understanding of carbohydrate, amino acid metabolism and its significance

COURSE OUTLINE

UNIT : I

(12 hrs)

Introduction to Intermediary metabolism. Basic metabolic pathways – anabolic, catabolic and amphibolic pathways. Carbohydrate metabolism- Glycolysis , TCA Cycle and its regulation.

UNIT: II

(12 hrs)

HMP Shunt, Glycogenesis, Glycogenolysis and Gluconeogenesis. Hormonal regulation of glycogen metabolism.

UNIT : III

(12 hrs)

Amino acid metabolism – General catabolic reaction of amino acids- transamination, oxidative and non- oxidative deamination, decarboxylation . Urea cycle and its regulation

UNIT: IV

(12 hrs)

Degradation of glucogenic and ketogenic amino acids- Phenyl alanine, Threonine, Arginine, Tryptophan, Methionine. Biosynthesis of non essential amino acids- Asparagine, Glutamine, Serine

UNIT: V

(12 hrs)

Conversion of amino acids to specialized products- serotonin, GABA , dopamine, epinephrine, nor epinephrine, creatinine and creatine.

Detoxification mechanism – Hydrolysis, oxidation , reduction , and Conjugation with examples.

Recommended Text books :

1. Principles of Biochemistry (III Edition)- Lehninger, Nelson and Cox
2. Biochemistry (III Edition)- Voet &Voet

Reference:

1. Harpers Biochemistry- Murray et al
2. Textbook of Biochemistry (III Edition)- Zubey

Journals:

1. Journal of Nutrition & Intermediary metabolism=Elsevier
2. International journal of Biochemistry Research & Review
3. International journal of Biochemistry-Sciencedirect.com

Website :

1. www.wormbook.org/...intermetabolism/
2. www.science-projects.com/MetPathways.html
3. www.sciencedomain.org

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| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

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PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER V
INTERMEDIARY METABOLISM II

TEACHING HOURS:60

CREDITS: 4

COURSECODE: BC15/5C/IN2

LTP : 4 0 0

OBJECTIVES:

To enable the student to have a thorough understanding of lipid metabolism, nucleotide metabolism and biological oxidation.

COURSE OUTLINE

UNIT I: (12 hrs)

Lipid metabolism- oxidation of fatty acids (saturated , odd and even numbered)- α , β , and ω oxidation. Biosynthesis of saturated fatty acids (Palmitic acid) and unsaturated fatty acids. Ketogenesis.

UNIT II : (12 hrs)

Biosynthesis and Degradation of triglyceride, Phospholipid and Sphingolipid. Biosynthesis of Cholesterol – Regulation. Degradation of Cholesterol

UNIT III : (12 hrs)

Nucleotide metabolism – Biosynthesis of Purine and pyrimidine bases, salvage pathway. Degradation of purine and pyrimidine bases in the Uricotelic and Ureotelic systems. Coenzyme nucleotides- NAD, FAD, TPP,PLP

UNIT IV: (12 hrs)

Biological oxidation – Electron transport chain- components and reaction of ETC.

Theories of Oxidative phosphorylation- Redox loop and proton pump mechanism. Inhibitors of ETC and oxidative phosphorylation. High energy compounds and linkages.

UNIT V: (12 hrs)

Photosynthesis – Chloroplast , Thylakoid membrane, light and dark reaction, photo respiration and photo phosphorylation. Synthesis of Sucrose and Starch in plants.

Recommended Text books:

1. Principles of Biochemistry (III Edition)- Lehninger, Nelson and Cox
2. Biochemistry (III Edition)- Voet &Voet

Reference:

1. Harpers Biochemistry- Murray et al
2. Textbook of Biochemistry (III Edition)- Zubey

Journals:

1. Journal of Nutrition & Intermediary metabolism=Elsevier
2. International journal of Biochemistry Research & Review
3. International journal of Biochemistry-Sciencedirect.com

Website:

1. www.wormbook.org/...intermetabolism/
2. www.science-projects.com/
3. www.sciencedomain.org
4. pubs.acs.org

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PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

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SEMESTER-V

CLINICAL BIOCHEMISTRY

TEACHING HOURS:60

CREDITS: 4

COURSE CODE: BC15/5C/CLI

LTP: 4 0 0

OBJECTIVE:

To enable the student to have a fundamental understanding of etiology, pathophysiology, symptoms and treatment of various diseases.

COURSE OUTLINE

UNIT-I :

(12 hrs)

Blood Cells- function – Clinical significance. Haematology- normal values, blood disorders- Anaemia, polycythemia, leucopenia, leucocytosis, Thrombocytopenia. Haemophilia, Thalassemia, sickle cell Anaemia, Porphyria. PCV,ESR.

UNIT-II:

(12 hrs)

Disorders of carbohydrate metabolism- Diabetes- Types, diagnosis, complications and treatment. Glycogen storage diseases, Galactosemia. Hereditary disorders of Amino acid metabolism- Tyrosinemia, Phenylketo nuria, Alkaptonuria, Hartnup's disease, Cystinuria, Fanconi's syndrome. Prenatal diagnosis- Amniocentesis and Chronionic villus sampling.

UNIT-III :

(12 hrs)

Disorders of lipid metabolism- Hyper and hypo Lipoproteinemia- Types, pathology and treatment. Lipidosis- Niemann pick's disease, Taysach's Disease, Gaucher's disease, Aththerosclerosis, Fatty liver, Coronary heart disease- causes & symptoms

Disorders of nucleic acid metabolism – Lesch Nyhan syndrome, gout, xanthinuria, orotic aciduria.

UNIT-IV:

(12 hrs)

Gastric function test- examination of resting content, fractional gastric analysis using test meal, stimulation test- alcohol, histamine and insulin. Tubeless gastric analysis. Renal function test- Classification, clearance test- urea, creatinine and inulin. PAH test, filtration fraction. Concentration and dilution tests.

UNIT-V:

(12hrs)

Liver function test- bilirubin metabolism, jaundice and its differential diagnosis, VD berg reaction, hippuric acid test. BSP retention test, prothrombine time, serum enzymes in liver diseases. Clinical enzymology- marker enzymes for cardio vascular disease, pancreatic and bone disease.

Recommended Text books :

1. Textbook of Medical Biochemistry-M.N.Chatterjee and Rana shinde
2. Davidson's principles and practice of medicine (XX edition)-John A.A. Hunter
3. Clinical Medicine (VI edition)-Pravin kumar & clark

Reference:

1. Clinical chemistry in diagnosis and treatment (VI edition)-Philip.D.Mayne

Journals:

1. Indian Journal of Clinical Biochemistry
2. Annals of Clinical Biochemistry

Website:

www.elsevier.com/locate/clinbiochem

www.acb.sagepub.com

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SEMESTER-V

PHYSIOLOGY

TEACHING HOURS:60
COURSE CODE: BC15/5C/PHS

CREDITS: 4
LTP: 4 0 0

OBJECTIVE:

To study about the structure and function of vital organ systems and hormones.

COURSE OUTLINE

UNIT-I :

(12 hrs)

Blood- composition & function. Types of blood cells, morphology & function- RBC, WBC, platelets erythropoiesis. Blood groups- A B O & Rhesus system; coomb's test, Bombay blood group, function of plasma proteins. Composition & functions of lymph & lymphoid system,

Circulatory system- structure and function of heart, arteries, veins and capillaries.

UNIT-II :

(12 hrs)

Muscular system- types of muscle & functions. Anatomy of skeletal muscles. mechanism of contraction of skeletal muscle. brief outline of nervous system, structure of brain, spinal cord, nerve fibres. Synapses- chemical and electrical synapse, nerve impulse, action potential and neuro transmitters.

UNIT-III:

(12hrs)

Urinary system- over all design of urinary system. Kidney structure and organization. Structure, function and classification of nephrons. Mechanism of urine formation- functions of glomerular filtration rate and selective reabsorption and tubular secretion.

UNIT-IV:

(12hrs)

Physiological anatomy of respiratory system- respiratory units and function. Exchange of gases.

Digestive system- structure and function of different components of digestive system, mechanism of secretion of HCL, Role of hormones and enzymes in digestive process. Digestion of carbohydrates, lipids and proteins .

UNIT-V :

(12 hrs)

General organization of endocrine system- classification of hormones. Biological functions- thyroïd, para thyroïd, insulin, glucagon, hormones of the adrenal glands and gonadal hormones.

Recommended text books :

1. Human Anatomy & Physiology – Elaine N. Marieb ,4th edition
2. Animal physiology – Mariakuttikan and Arumugam

Reference books :

1. Textbook of Medical Physiology – Guyton & Hall , 6th edition
2. Human Physiology – Dr.C.C.Chatterjee
3. Davidson’s Principles and Practice of Medicine (XX Edition)- John.A.A.Hunter

Journals:

1. National Journal of physiology pharmacy and pharmacology
2. Journal of physiology - Elseiver

Website:

physiologyonline.physiology.org
www.brainmac.co.uk/physoil.html

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SEMESTER V

ELECTIVE -BIOINSTRUMENTATION & BIostatISTICS

TEACHING HOURS:75

CREDITS: 5

COURSE CODE: BC15/5E/BIB

LTP : 5 0 0

OBJECTIVE:

To enable the students to understand the techniques in diagnosis of various clinical condition and to analyse data in analysis programme

COURSE OUTLINE

Unit – I

(12 hrs)

(Hematology – parameters, routine methods, Hematology analyzer. Biochemistry – Colorimetry based estimation of metabolites using enzyme kits (Glucose estimation using Glucose oxidase) kits for kinetic assay of enzymes (LDH). Flame photometry for electrolyte instrumentation. Overview of ELISA, ImmunoFluorescence and Chemiluminescent methods for hormone assays (competitive and sandwich approaches)

Other samples used in laboratory – urine (uristix), CSF, faeces, Amniotic fluid (Amniocentesis)

Unit – II

(12 hrs)

(Detection of Pathogens- Serology (Widal), Microscopic methods (Malarial parasite), culture methods & Antibiotic sensitivity. Diagnostic procedures – Histopathology, X-ray (Angiogram). Different types of scan – Ultrasound, Computerised Axial Tomography. Methods based on electrical activity – ECG, EEG, Blood pressure measurements, Respiratory gas analyzer, Spirometer.

Unit – III

(12 hrs)

Therapeutic procedures- Blood banking, Dialysis unit- Hemodialysis and Peritoneal dialysis, Ventilator, Pacemaker, Defibrillator, Artificial valves, Laser applications in Medicine. Shortwave and Microwave diathermy. Radiotherapy equipment.

Unit – IV

(12 hrs)

(Biostatistics – Outline of Statistical Investigations. Population and sample. Collection of data, primary and secondary data. Presentation of data in the form of tables and graphs- Line diagram, bar diagram, (different types). Piediagrams, Pictograms, cartograms, Use of Excel to prepare graph.

Unit – V**(12 hrs)**

Measures of central tendencies- Mean , Median, Mode (individual data, discrete series, continuous series). Measures of dispersion- Range, quartile, deviation, standard deviation (Individual data, discrete series, continuous series) Use of excel to calculate central tendencies and dispersion measures

Recommended text books :

1. Introduction to Biostatistics – N.Gurumani, MJP Publishers
2. Handbook of Biomedical instrumentation-Second edition-R.S.Khandpur

Reference books :

1. Theory and problems of Statistics – Schaum's outline series

Journals:

1. International journal of Instrumentation Technology
2. The international journal of Biostatistics-De Gruyter

Website:

www.stat.isu.edu

www.inderscience.com

www.degruyter.com

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PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER VI
MOLECULAR BIOLOGY

TEACHING HOURS : 60

COURSE CODE : BC15/6C/MOL

CREDITS : 4

L T P : 4 0 0

OBJECTIVE

- Introducing the molecular concepts of life processes
- Understanding the molecular basis of cellular activities

COURSE OUTLINE

Unit I : (12 hrs)

Gene Organization - Genes, DNA sequences – Unique and repetitive sequences, coding , non coding DNA ,Satellite DNAs , Cot Curves , Chromosomes – Types, properties, Prokaryotic gene organization , Eukaryotic gene organization.

Unit II : (12 hrs)

DNA Replication - Chemistry of DNA synthesis, Modes of DNA replication , Semiconservative Replication – Meselson and Stahl experiment, Enzymes of DNA replication – DNA polymerases, Helicases, Primase, Ligase s, Topoisomerases, Prokaryotic replication. Brief outline of eukaryotic replication.

Unit III: (12 hrs)

Transcription - Chemistry of Transcription, RNA polymerases, Role of sigma factor, Closed and open promoter complexes, Prokaryotic Transcription , Brief outline of Eukaryotic Transcription, Post transcriptional modifications of m RNA – capping, tailing, splicing

Unit IV : (12 hrs)

Translation - Basic features and deciphering of the Genetic code, Genetic code dictionary, wobble hypothesis, Ribosomes, Protein synthesis in prokaryotes - Activation of amino acids, aminoacyl tRNA synthetases, tRNA as adaptor molecule, Prokaryotic translation, post translational modifications .

Unit V : (12 hrs)

Mutation and DNA Repair - Mutation – Types, Physical and chemical mutagens, DNA damages and mutations, DNA repair – Direct repair systems, Excision repair – Base and nucleotide excision repair, Mismatch repair .

Recommended Text Books

1. Biochemistry - Voet Donald and Voet Judith : 2004. Wiley International Edition , 3rd Edition : John Wiley & Sons.

2. Lehninger Principles of Biochemistry – Nelson David and Cox Michael : 2004 .
W.H.Freeman & Co : New York
3. Essentials of molecular biology- V.Malathi, 2013 , First Edition, Pearson Publishers.

Reference Books

1. Molecular cell biology – Lodish , Harvey, Berk, Arnold, Zipursky, Lawrence, Matsudaira, Paul, Baltimore : 2006, 4th Edition, W.H Freeman & Co .
2. Lewin's Genes X– Krebs Jocelyn, Lewin Benjamin, Goldstein, Elliott, Kilpatrick, Stephen : 2009 . Jones and Bartlett.
3. The world of cell – Becker, Wayne , Kleinsmith, Lewis, Hardin, Jeff ,Bertoni ,Gregory paul : 2009, 7th Edition, Pearson Education Inc.

Journals:

1. Journal of Molecular Biology-Elsvier
2. Journal of Molecular Biology Research-

Website:

www.ccsenet.org

Question paper pattern :

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| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

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PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER VI
GENETICS

TEACHING HOURS : 60

CREDITS : 4
L T P : 4 0 0

COURSE CODE: BC15/ 6C/GTS

OBJECTIVE

- Understanding Genes and their role in life processes
- Understanding the basis of genetic inheritance

COURSE OUTLINE

Unit I (12 hrs)

Mendelian Genetics : Contributions of Mendel, Mendel's Hybridization experiments, Alleles, Monohybrid cross, Dihybrid cross, Genotype, Phenotype, Back Cross, Test cross, Dominant, Recessive relationships. Reciprocal crosses.

Unit II (12 hrs)

Mendelian Laws : Mendel's Law of Dominance, Law of segregation, law of Independent assortment, Incomplete Dominance, Co dominance, Gene Interactions – Complementary, Supplementary genes.

Unit III (12 hrs)

Bacterial Genetics: Bacterial genome, Gene exchange mechanism in Bacteria- transformation – Griffith's Experiment, Transforming principle, Mechanism of Transformation, Transduction – types, Conjugation- F factor, F plasmid, Mechanism of conjugation, high frequency recombination (Hfr) strain.

Unit IV (12 hrs)

Genetic Inheritance: Sex determination, X-Linked Inheritance, Y-linked inheritance, Autosomal Inheritance - Dominant and recessive Inheritance, Linkage, crossing over, Gene mapping

Unit V (12 hrs)

Genetic Diseases: Human karyotype, Chromosome Banding, Chromosomal aberrations, Chromosomal abnormalities – Down's Syndrome, Klinefelter's syndrome, Turner's syndrome (Basic Concepts)

Recommended Text Books

1. Essentials of Molecular Biology (IV edition)- David Friefelder
2. Fundamentals of Biochemistry – Donald Voet and Judith Voet
3. Genetics – Verma & Agarwal

Reference Books

1. Gene X- Benjamin Lewin
2. Genetics - Gardner

Journals:

1. Journal of Genetics-Indian Academy of Science
2. Open journal of Genetics- an academic Publisher
3. Journal of Genetics & Genomics-Elsevier

Website:

www.ias.ac.in

www.scrip.org

Question paper pattern :

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER VI
BIOTECHNOLOGY

TEACHING HOURS : 60
COURSE CODE:BC15/6C/BTG

CREDITS : 4
LTP : 4 0 0

OBJECTIVE

To enable student to have an understanding of the practical aspects of recombinant DNA technology and applications of Biotechnology, in agricultural, pharmaceutical and clinical vector

COURSE OUTLINE

UNIT -I : (12 hrs)

Introduction to Biotechnology- scope and importance, tools of R-DNA technology ; enzymes, linkers, adaptors, vector- plasmid, phages, cosmid, viral, shuttle and expression vectors.

UNIT-II: (12 hrs)

Strategies of r-DNA Technology; Isolation and identification of gene of interest- Gene library, PCR, Blotting- southern, northern, western, automated gene machine. Gene transfer methods – Electroporation, transformation, liposome mediated transfer, transduction, gene gun method, selection of recombinants, - marker gene and reporter genes for animal and plant cells, colony hybridization methods. Blue white selection method, Insertional inactivation method and immunological method.

UNIT-III: (12 hrs)

Plant Biotechnology: plant tissue culture- requirements for plant tissue culture, types of culture, application of plant tissue culture. Application of Transgenic plants- herbicide resistant crops and Insect resistant crops

UNIT-IV: (12 hrs)

Animal Biotechnology: Requirement for animal tissue culture, mammalian cell culture stem cell culture, cell lines and its maintenance. Application of animal cell culture. Transgenic animals and its application.

Medical Biotechnology: production of insulin, interferon, tPA ,Principles of Gene therapy.

UNIT-V: (12 hrs)

Industrial Biotechnology : fermentation, fermentor and fermentation process-types. Downstream processing- production of Vinegar, Single Cell Protein-Algae.

Enzyme Biotechnology: Immobilization of enzymes, methods of immobilization. Industrial application of enzymes- food industry, textile industry, pharmaceutical industry, paper and pulp industry.

Recommended Books:

1. Biotechnology – U.Sathyanarayana
2. Textbook of Biotechnology- R.C.Dubey
3. Biotechnology – Kumaresan

Reference books :

1. Molecular Biotechnology- Glick and Pasternick
2. Molecular Biotechnology- Primrose
3. Essentials of Biotechnology-Michael Crichton.

Journals:

1. Indian journal of Biotechnology – niscair
2. International journal of Biotechnology (IJBT)

Website :

www.niscair.res.in

www.gate2biotech.com/instantnotes-

Question paper pattern:

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
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| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER VI

ELECTIVE- BASICS OF BIOINFORMATICS

TEACHING HOURS:75

CREDITS : 5

COURSE CODE: BC15/6E/BOB

L T P : 5 0 0

OBJECTIVE

To study the fundamentals of genomics, proteomics and its applications

COURSE OUTLINE

Unit I (15 hrs)

Basics of internet – IP address, domain names, URL; networks - LAN, WAN; communication protocols – TCP, IP, FTP, HTTP; www, web browsers, search engines. Flat files, relational, object oriented databases.

Unit II (15 hrs)

Bioinformatics - Relationship between computers and biology; Principles, challenges and applications of bioinformatics. Biological databases. NCBI, Nucleic acid sequence databases: GenBank, EMBL, DDBJ; Protein sequence databases: Uniprot, PIR; Structure Database: PDB; literature database – PubMed; Data retrieval systems – Entrez.

Unit III (15 hrs)

Introduction to Sequences, alignments, type of alignments and their significance, Dot plot, hash coding. Pairwise alignment (BLAST) and multiple sequence alignment (**Clustal W algorithm**).

Unit IV (15 hr s)

Protein Structure: Primary, Secondary, Super Secondary, Tertiary, Quaternary, Peptide bond, phi, psi and chi torsion angle significance of Ramachandran plot; Motif and Domain. 3D **Protein structure prediction (homology modelling)** and structure visualization.

Gene prediction, human genome project and its significance, OMIM.

Unit V (15 hrs)

Basics of Phylogenetic analysis - definitions of homologs, orthologs, paralogs and xenologs; Definitions for proteomics, genomics, Metagenomics, Transcriptomics, Metabolomics, Lipidomics, Interactomics. Chemoinformatics, pharmacogenomics; Drug designing- Steps in drug development. Structure based drug designing.

Recommended Books:

1. Essential Bioinformatics by Jin Xiong
2. Text book of Bioinformatics-Sharma and Munjal

Reference books :

1. Bioinformatics: Sequence and Genome Analysis by Mount D., Cold Spring Harbor Laboratory Press, New York. 2004

2. Bioinformatics- a Practical Guide to the Analysis of Genes and Proteins by Baxevanis, A.D. and Francis Ouellette, B.F., Wiley India Pvt Ltd. 2009
3. Introduction to bioinformatics by Teresa K. Attwood, David J. Parry-Smith. Pearson Education. 1999

Journals:

1. Bioinformatics-Oxford journal
2. BMC Bioinformatics
3. Bioinformatics.oxfordjournals.org

Website :

1. www.ncbi.nlm.nih.gov
2. www.ebi.ac.uk

Question paper pattern :

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
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| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER VI
ELECTIVE-IMMUNOLOGY

TEACHING HOURS:75

COURSE CODE: BC15/6E/IMG

COURSE OUTLINE

CREDITS : 5

L T P : 5 0 0

Unit – I

(15 hrs)

Infection – pathogenicity, virulence, **Immunity** – Innate Immunity, types, Non specific body defence- Anatomical, physiological, phagocytic, Inflammatory Barriers. Acquired Immunity – Natural, Artificial , Active , Passive. Antibody – classes, structure and biological function. Humoral and cell mediated immunity.

Unit – II

(15 hrs)

Cells involved in Immune response – T,B and Null cells, Structure and functions of lymphoid organs- Thymus, bone marrow, spleen, lymph nodes, MucousAssociated Lymphoid Tissue, Gut Associated Lymphoid Tissue.

Unit – III

(15 hrs)

Antigen , factors affecting antigenicity, epitope , haptens , adjuvants. Clonal selection theory , Co-operation of T cells & B cells. Overview of Major Histocompatibility Complex and HLA Antigens.

Unit – IV

(15 hrs)

Principles of Ag-Ab interaction – Precipitation, agglutination, opsonisation , flocculation , and application. Principle – ELISA, RIA, Immuno electrophoresis and Immunofluorescence . Monoclonal Ab- Hybridoma technology and applications.

Unit – V

(15 hrs)

Hypersensitivity – types – I, II, III, & IV. Autoimmune diseases – Hashimoto's thyroiditis and Rheumatic arthritis. Transplantation Immunology (overview) – types of grafts, graft rejection

Recommended Text books:

1. Immunology (VI Edition)- Kuby
2. Essential Immunology (III Edition) –Roitt

Reference Books:

1. Immunology an Introduction (V edition)- L.R.Tizard
2. Immunology a short course – Eli Benjamin

Journals:

1. Journal of Immunology Research
2. Open journal of Immunology-scientific Research Publishing

Website :

1. www.whfreemen.com/kuby
2. www.immunologylink.com
3. www.hindawi.com

Question paper pattern :

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER -V & VI
MAJOR PRACTICAL -III

TEACHING HOURS: 120
COURSE CODE: BC15/6C/PR3

CREDITS: 3
LTP : 0 0 4

I. COLORIMETRY – Serum Analysis

- a) Estimation of Creatinine (Jaffe's method)
- b) Estimation of Urea
- c) Estimation of Cholesterol
- d) Estimation of Glucose (Orthotoluidine method)
- e) Estimation of Phospholipid (Fiske and subbarow method)
- f) Estimation of protein(Lowry method)
- g) Estimation of Vitamin C
- h) Estimation of Iron(Dipyridyl method)
- i) Estimation of Uric acid (kit method)

II. HEMATOLOGY (Group Experiments)

- a) Total count of RBC, WBC and Platelets
- b) Differential count of WBC
- c) Hematocrit and ESR
- d) Estimation of Hemoglobin (Drabkin's reagent)

III. URINE ANALYSIS

- a) Analysis of normal and abnormal constituents

SEMESTER -V & VI
MAJOR PRACTICAL -IV

TEACHING HOURS: 135
COURSE CODE: BC15/6C/PR4

CREDITS: 3
LTP : 0 0 5

I. QUANTITATIVE ANALYSIS

1. Estimation of DNA(Diphenyl amine method) ✓
2. Estimation of RNA(Orcinol method) ✓
3. Estimation of xylose (Orcinol method) ✓

II. Enzymology

Activity of

- i) Amylase ✗
- ii) SGOT ✓
- iii) SGPT ✓
- iv) ALP ✓
- v) LDH ✓
- vi) Effect of Temperature, pH , & Substrate concentration of Salivary amylase. ✓

SEMESTER I
ALLIED BIOCHEMISTRY I
(For I B.Sc. Microbiology)

TEACHING HOURS: 60
COURSE CODE: BC15/1A/BC1
OBJECTIVES

CREDITS: 4
LTP :3 1 0

To enable the students to learn

1. The chemistry of biomolecules
2. Understand metabolic cycles.

COURSE OUTLINE

Unit I (12 Hrs)

Carbohydrates – Definition, biomedical importance of carbohydrates, classification of carbohydrates (monosaccharides, disaccharides, polysaccharides), Vant Hoff's rule, stereoisomerism, optical isomerism, racemic mixture, mutarotation, epimers, aldose, ketose.

Unit II (12 Hrs)

Monosaccharides- Linear structure and Haworth structure of glucose and fructose, Disaccharides – lactose and sucrose, Inversion , polysaccharides – Homoglycans- structure of starch and glycogen, ~~difference between amylose and amylopectin and glycogen.~~ *Heteropolysaccharides*

Unit III - *Chondroitin Sulfate* (12 Hrs)

(Definition of catabolism, anabolism and amphibolic cycle. Glycolysis and TCA cycle with energetics) (Structure not required) *ultrasonography*

Unit IV (12 Hrs)

(Amino acids- Functions of amino acids, classification of amino acids based on side chain, essential, semi-essential and non-essential amino acids, zwitter ion, amphoteric nature and isoelectric point)

Unit V (12 Hrs)

Proteins- Biomedical importance of protein classification based on shape and size (fibrous and globular) (based on function) and based on physical properties. structural organization of proteins- primary, secondary, tertiary and quaternary structure, - basic concepts.

Recommended Textbooks:

1. Fundamentals of Biochemistry – J.L. Jain, S.Chand & Company, 6th Edition

Reference Books:

1. Textbook of Biochemistry – O.P. Agarwal *et al*
2. Harpers Illustrated Biochemistry- Murray et al, 26th edition

Journal:

1. Journal of Biomolecules=Open access
2. International journal of Biological macromolecules-Elsvier
3. Journal of Biomolecules- Wiley
4. Journal of Biomolecular Techniques=JBT

Website

www.phschool.com/science/biology_place/

www.wtec.org/te/usws/usws

Question paper pattern :

The pattern of question paper shall be as follows:

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| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

Unit V : Hormones :- classification, Pituitary hormones, parathyroid hormones, Testosterone, Insulin, Glucagon, Adrenocortical hormone, Estrogen (Biology significance only).

**SEMESTER II
ALLIED BIOCHEMISTRY II**

(For I B.Sc. Microbiology)

TEACHING HOURS: 60

CREDITS: 4

COURSE CODE: BC15/2A/BC2

LTP : 3 1 0

OBJECTIVES

To enable the students to learn

1. The chemistry of biomolecules
2. Understand enzymology.

COURSE OUTLINE

Unit I (12 Hrs)

Enzymes- Definition of enzyme, active site, holoenzyme, apoenzyme, coenzyme, exo and endo enzymes, zymogen, turnover number. Specificity of enzymes, industrial applications of enzymes, Factors affecting enzyme activity- pH, Temp, substrate. Enzyme inhibition- competitive, non-competitive and uncompetitive inhibition. (no derivation).

Unit II (12 Hrs)

Lipids- biomedical importance of lipids, Bloor's classification of lipids(simple, compound and derived), saturated and unsaturated fatty acids, essential fatty acids (EFA) and their functions, deficiency manifestation of EFA, properties- Saponification and rancidity, iodine number, acetyl number,. Phospholipids- functions, Biological importance of cholesterol, bile acids and bile salts.

Unit III (12 Hrs)

Purine and pyrimidine bases with structures, nucleosides, nucleotides, nucleosides and nucleotides, biological importance.

Unit IV (12 Hrs)

DNA- structure (Watson and Crick model), Chargaff's rule, types of DNA- A, B and Z- DNA, properties of DNA,- effect of temperature of DNA, annealing

Unit V (12 Hrs)

RNA- types of RNA- m-RNA, r-RNA and t-RNA, clover leaf model of t- RNA, difference between DNA and RNA; Biological importance of RNA.

(a) Properties of DNA - Effect of temperature, chemical stability, DNA denaturation & renaturation, nucleic acid base pairing.

RECOMMENDED TEXTBOOKS:

1. Fundamentals of Biochemistry – J.L. Jain, S.Chand & Company, 6th Edition

REFERENCE BOOKS:

2. Textbook of Biochemistry – O.P. Agarwal *et al*
3. Harpers Illustrated Biochemistry- Murray et al, 26th edition

JOURNAL

1. Journal of Biomolecules=Open access
2. International journal of Biological macromolecules-Elsvier
3. Journal of Biomolecules- Wiley
4. Journal of Biomolecular Techniques=JBT

WEBSITE

www.phschool.com/science/biology_place/

www.wtec.org/te/usws/usws

Question paper pattern:

The pattern of question paper shall be as follows:

| COMPONENT | NATURE OF THE QUESTION | MAXIMUM MARKS |
|-----------|---------------------------|---------------|
| PART A | Definition and structures | 20 |
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| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER I & II
ALLIED BIOCHEMISTRY PRACTICAL

TEACHING HOURS: 60

COURSE CODE: BC15/2A/BPR

CREDITS: 2

LTP: 002

Teaching Hours

I Qualitative Analysis of carbohydrates –

Glucose, fructose, maltose, sucrose

Monosaccharides: Glucose, Fructose

Disaccharides: Maltose, Sucrose

II Qualitative Analysis of amino acids –

Arginine, cysteine, tryptophan, tyrosine

Polysaccharides: starch, ~~cellulose~~

III Spotters –

Centrifuge, compound microscope, pH meter, weighing balance, colorimeter, incubator

IV Demo experiment-

Estimation of protein by biuret method

V Group experiment

Preparation of starch from potato

Preparation of casein from milk

SEMESTER -I
ALLIED BASIC CHEMISTRY-I
(For I B.Sc Clinical Nutrition and Dietetics)

TEACHING HOURS: 60

CREDITS: 4

COURSE CODE: BC15/1A/CH1

LTP : 3 1 0

OBJECTIVES:

1. To enable students understand the fundamental aspects of inorganic, electro and analytical chemistry.

2. Students gain knowledge in the uses of chemistry in daily life

COURSE OUTLINE

UNIT I:

(12 Hrs)

I a. Chemical bonding- Definition- Types of bonds - Formation of different bonds with examples --Ionic bond – NaCl, KCl -Covalent bond- Single bond- H₂S,HCl, Multiple bond – N₂ , O₂-- Co ordinate bond –Hydronium ion, ammonium ion--Hydrogen bond – Inter and Intra molecular Hydrogen bonding e.g. O & P Nitrophenol-- Vanderwaals force.

I b. Shapes of molecules – VSERR Theory & Hybridization CH₄ , H₂O, NH₃, BrF₃ , SF₆ ,IF₅ , IF₇.

UNIT II:

(12 Hrs)

Mechanistic basis of organic reactions – Definition of substrates – Electrophiles , Nucleophiles – Elementary treatments of Substitution reactions SN₁ , SN₂ Walder inversion - Aromatic Electrophilic substitution (Nitration, sulphonation) - Elimination Reaction- E₁ , E₂ Hoffmann and saytzeff rule- Addition Reaction – Markonikoff's rule and Kharash effect.

UNIT III:

(12 Hrs)

Food chemistry – Food adulteration – Definition – Intentional addition and incidental addition – Common adulteration/contaminants in food – Food simple screening test for the detection of adulterants – Diseases or health effects caused by the adulterants – Prevention of Food Adulteration Act -1954.

UNIT IV:

(12 Hrs)

Acids and bases – Arrhenius concept- Bronsted-Lowry concept- conjugate acids and bases – Lewis concept Concept of pH and pOH – Determination of pH using potentiometric method (pH meter) –Buffer examples for acidic and basic buffer – Buffer action – Biological applications of buffers.

UNIT V:**(12 Hrs)**

Volumetric analysis – Advantages of Volumetric analysis over other quantitative analysis – Preparation of solutions – Primary and Secondary Standards – (examples) – Definition of Mole, Molarity, Molality, Normality, Formality Dilution – Difference between end point, equivalence point - Types of volumetric analysis – Acidimetry and Alkalimetry – Examples & Indicators used Strong acid Vs Strong base, Strong acid Vs Weak base, Weak acid Vs Strong acid, Weak acid Vs Weak base – Redox Titrations – Permanganometry, Dichrometry, Iodometry Iodimetry – Complexometry – EDTA Titrations.

RECOMMENDED TEXTBOOKS

1. Allied Chemistry-Gopalan and Sundaram, 3rd edition
2. Text Book of Allied Chemistry-Dr. V. Veeraiyan et al, Highmount Publishing House

REFERENCE BOOKS

1. Modern Inorganic Chemistry-R.D. Madan
2. Organic Chemistry-P.L. Soni
3. Principles of physical chemistry-Puri and Sharma

JOURNALS

1. Biochemistry-ACS publication
2. Biochemical journal
3. Pubs.acs.org

WEBSITES

<http://www.chemistry.org>

<http://www.chemhelper.com>

Question paper pattern:

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| PART B | Understanding concepts | 40 |
| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER – II
ALLIED BASIC CHEMISTRY-II
(For I B.Sc Clinical Nutrition and Dietetics)

TEACHING HOURS: 60
COURSE CODE: BC15/2A/CH2
OBJECTIVES

CREDITS: 4
LTP :3 1 0

To enable students to

1. Understand the basics co-ordination, Industrial and drug chemistry
2. Application of chemistry in daily life.

COURSE OUTLINE

Unit I:

(12 Hrs)

Co –ordination Chemistry – Difference between Double salt and Co-ordination Compounds. Nomenclature Werner's theory, Definition and Biological importance of Chelates – Haemoglobin, Application of chelates – medicinal and analytical –Determination of hardness of water and softening of water.

Unit II:

(12 Hrs)

Industrial Chemistry – Fuels, Classification, Fuel Gas – natural gas, Water gas, Semi water gas, Carbureted Water gas, Producer gas, Oil gas, Gobar gas and LPG- Composition and uses. Silicones – Preparation, properties and uses. Synthetic Dyes – Classification of Dyes, Azo, Triphenylmethane, Vat and Mordant Dyes and their preparation.

Unit III:

(12 Hrs)

Drug Chemistry – Classification of drugs, Preparation and Properties of Sulpha drugs, Sulpha pyridine, Prontosil, Sulpha diazine and Sulpha furazole. Mode of action of Sulpha drugs.

Antibiotics – Penicillin, Chloramphenicol. Definition, example each for analgesics, antipyretics, tranquillizers, sedatives, hypnotics, local and general anaesthetics.

Unit IV:

(12 Hrs)

Food Chemistry – Food additive – Definition – Purpose of addition – Examples – Food colours – Flavours – Sweeteners – Fat emulsifiers – Stabilizing agents – Flour improvers- Anti staling agents – antioxidants – Preservatives- Nutritional supplements – Food Fortification – Biological importance of Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Potassium(P).

Unit V:**(12 Hrs)**

Isolation and Purification of Organic Compounds – Extraction , Differential extraction , Distillation, Fractional distillation , Steam distillation Crystallization, Sublimation, Separation Technique – Chromatography – Paper , TLC and Column.

RECOMMENDED TEXTBOOKS

1. Allied Chemistry-Gopalan and Sundaram, 3rd edition
2. Text Book of Allied Chemistry-Dr.V.Veeraiyan et al,Highmount Publishing House

REFERENCE BOOKS

1. Modern Inorganic Chemistry-R.D.Madan
2. Organic Chemistry-P.L.Soni
3. Principles of physical chemistry-Puri and Sharma

JOURNALS

1. Biochemistry-ACS publication
2. Biochemical journal
3. Pubs.acs.org
4. www.biochemj.org

WEBSITES

<http://www.chemistry.org>

<http://www.chemhelper.com>

Question paper pattern:

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| PART C | Description/synthesis | 40 |

PART A: 10 questions, compulsory 2 questions from each unit (10X2=20)

PART B: 5 out of 8 questions, compulsory 1 question from each unit (5X8=40)

PART C: 2 out of 4 questions, each from different units (2X20=40)

SEMESTER I & II

ALLIED CHEMISTRY PRACTICAL

(for I B.Sc Biochemistry & I B.Sc CND)

TEACHING HOURS: 60

CREDITS: 2

COURSE CODE : BC15/2A/CPR

LTP: 0 0 2

VOLUMETRIC ANALYSIS

- 1) Estimation of HCl using Standard Oxalic Acid.
- 2) Estimation of Borax – Standard Sodium Carbonate.
- 3) Estimation of Ferrous Sulphate – Standard Mohr Salt Solution.
- 4) Estimation of Oxalic Acid – Standard Ferrous Sulphate.
- 5) Estimation of Ferrous Ion – Diphenylamine Indicator.
- 6) Estimation of Zinc Using EDTA – Standard Magnesium Sulphate.

ORGANIC SUBSTANCE ANALYSIS:

Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests.

- 7) Reaction of Aldehyde (Aromatic).
- 8) Reaction of Carbohydrates.
- 9) Reaction of Carboxylic Acid (Mono & Di).
- 10) Reaction of Phenol.
- 11) Reaction of Amine (Aromatic, primary).
- 12) Reaction of Amide (Mono & Di).
- 13) Reaction of Ketone (not for exam)

SEMESTER I
YOGA AND DIET
(For other departments)

TEACHING HOURS: 30
COURSE CODE: BC15/1N/YAD
OBJECTIVE

CREDITS: 3
LTP:2 0 0

To create an awareness on

1. Yogasanas
2. Balanced diet for complete well being.

COURSE OUTLINE

UNIT 1 (10 hours)

Yoga-definition, Types of Yogas, prerequisites for yoga, Pranayama, and benefits, Work place yoga.

UNIT II (10 hours)

Basic asanas and their benefits – Padmasana, Vajrasana, Bhujangasana, Dhanurasana Shavasana.

UNIT III (10 hours)

Different classes of nutrients in food and their basic functions, Food sources of carbohydrates, proteins, lipids, vitamins, iron and calcium, food pyramid, types of vegetarian diets.

Recommended Books

1. Yoga – Master the Yogic Powers – Jack Peter, First Edition, Abishek Publications\
2. Nutrition Essentials and Diet Therapy – Pecken Paugh, Saunders Elsevier

Web sites

1. www.artofliving.org/in-en/yoga
2. www.artofliving.org

Question paper pattern:

Ten out of twelve questions (5x10=50)

~~SEMESTER III~~ **SEMESTER IV**
LIFE STYLE DISEASES IN WOMEN
(For other department)

TEACHING HOURS: 30 HOURS

COURSE CODE: BC15/2N/LSD

OBJECTIVE:

CREDITS: 3

LTP: 2 0 0

To create awareness about

1. Lifestyle diseases and disorders in women.

2. Food habits and health

COURSE OUTLINE

UNIT-I

(10 Hours)

Health problems in women-Anaemia, skin and hair problems, Cancer- Breast cancer, Cervical cancer-symptoms, diagnosis and treatment, significance of breast feeding, Obesity.

UNIT-II

(10 Hours)

Food habits and health- Balanced diet-diet for women-Carbohydrate, lipid, protein, vitamin and minerals-sources, requirements and deficiency symptoms.

UNIT-III

(10 Hours)

Adverse effects of junk food, eating disorders-Anorexia and Bulimia nervosa. Modern lifestyle habits. Health hazards of smoking and alcoholism, tight clothing, high heels, hair coloring, face bleach, tattooing, mobile phone radiation.

OUTCOME:

Students understand the significance and importance of healthy life style.

RECOMMENDED BOOKS:

1. Understanding nutrition-Eleanor, Noss, Whitney
2. Encyclopedia of Women health-Parvesh Handa

WEBSITE:

www.helpguide.org

www.healthsite.com

Question paper pattern:

Ten out of twelve questions (5X 10 = 50)