PERIYAR UNIVERSITY

SALEM – 636011

DEGREE OF MASTER OF SCIENCE

CHOICE BASED CREDIT SYSTEM

M.Sc. MEDICAL BIOCHEMISTRY

OBE REGULATIONS AND SYLLABUS

(SEMESTER PATTERN)

(For Candidates admitted in the Colleges affiliated to Periyar University from 2021-2022 onwards)
REGULATIONS

GOALS AND OBJECTIVES OF MEDICAL BIOCHEMISTRY

Medical Biochemistry is particularly emphasizing the multidisciplinary character of the profession in order to enable application of scientific knowledge in the medical context. Curriculum is harmonized with the recommendations that are accepted in the majority of European countries, and consists two years programme leading to the Post –Graduate Degree of Master in Medical Biochemistry.

GOAL OF MEDICAL BIOCHEMISTRY

Illuminate students the principles governing the structure, functional and interaction of biomolecules. At the same time new revision reflects tremendous development in Biochemistry. Significantly emphasize is placed on the interrelationship of ideas so the students could evaluate diagnostic data and provide an expert opinion to the medical team.

The multidisciplinary approach is achieved by introducing various disciplines into curriculum:

1. Biomedical disciplines (anatomy, physiology, Metabolism, Clinical & Nutritional Biochemistry, immunology and microbiology etc.);

2. Professional medical biochemistry discipline interprets with clinical biochemistry, haematology, clinical immunology, Bioanalytical techniques, Pharmaceutical toxicology, molecular diagnostics and Molecular Biology etc. The competences and skills in communication, laboratory management, automation, and information of laboratory system is also learned in theory and practicals.

3. Training programmes would be intensively correlated training in the hospital laboratory will start readily from the first year. The CBCS credits will be assigned to the each subject, and student mobility would be encouraged. There will be great co- operation with the teaching hospitals related to Faculty, in particular for the courses Integral laboratory diagnostics and Professional laboratory practice.

4. At completion of the new Medical Biochemistry curriculum the graduate would have a thorough knowledge of all aspects of medical biochemistry science relevant to the discipline, and competences to organize laboratory practice and apply current techniques, to evaluate the diagnostic data and to provide an expert opinion in the medical team, or to pursue a career in the fundamental and applied scientific research. The new concept comprises relevant knowledge in clinical cytology, microbiology, clinical immunology, blood banking, analytical toxicology, molecular diagnostics thus concurring with the current trends in Medical Biochemistry and
Our specific goals for the programme are to

- Provide a sound background in Basic Biochemistry for Students in Health sciences where these students can perform research work in the Medical, Eye and Dental hospitals
- Make students aware of the relevance of Biochemistry to Health-related professions
- Provide a working knowledge of Medical Biochemistry that will be applicable for the practice of Clinical Diagnostic Laboratory and could even run diagnostic lab on their own.

OBJECTIVES OF MEDICAL BIOCHEMISTRY

Student small-group learning experiences encourage professional behaviour and teamwork in a context that promotes use of resources such as the library, and information technology. Course topic scheduling is coordinated to prepare students for and reinforce topics in Clinical Physiology where possible. The following list is illustrative of the educational objectives of this course. Through interactive lecture sessions, small group sessions, and course examinations, students will be able to:

1) Recognize and explain the functions of the key molecular components and steps of the synthesis, assembly, and degradation of biological macromolecules;

2) Recall and relate the molecular structures and chemical properties of biological macromolecules to their functions including ligand/substrate recognition, enzyme reactions, formation of multi-molecular complexes; and regulation;

3) Relate digestive processes and body production of usable and storable chemical energy to the chemical composition of foodstuffs, including vitamin and nutrient requirements;

4) Describe the inputs and outputs of human intermediary metabolism, and relate mechanisms of metabolic regulation by hormones, feedback loops and other mechanisms to body organ systems and their demands for energy and metabolites

5) Recognize and explain the molecular basis of major body mechanisms for self-recognition and self-defense including blood factors, antibodies, anti-oxidants, hemostasis, and glucose homeostasis;

6) Describe key features and operating principles of the organization of the human genome, control of gene expression and cell cycle regulation;
SKILLS

1) Relate knowledge of normal bio-molecular structure-function relationships, metabolic and regulatory processes, and defense mechanisms to the molecular basis, diagnosis and treatment of diseases;

2) Recognize and explain the sources, detection and consequences of genetic defect(s) underlying diseases;

Attitudes/Behaviors:

1) Demonstrate a professional attitude and good communication skills by effective participation in cooperative problem solving, especially in small group exercises directed towards understanding the biochemical and genetic bases of disease origins, diagnoses and treatments.
1. **PREAMBLE AND OBJECTIVES OF THE COURSE:**

The syllabus aims to provide the strength to acquire an advanced knowledge and understanding of the core principles of Biochemistry.

The major objectives of M.Sc. Medical Biochemistry/Biochemistry/Microbiology course are,

- To study the structures and functions of biomolecules.
- To learn Anatomy and Physiology of human body
- To understand the principles, instrumentation and applications of analytical techniques.
- To study the principles of enzyme catalysis, bioenergetics and major metabolic pathways.
- To study the expression of molecular genes and molecular techniques.
- To understand human physiology and nutritional requirements.
- To study molecular concepts of body defenses and its mechanisms.
- To impart knowledge in principles and applications of clinical Biochemistry.
- To obtain knowledge in Pharmaceutical, Microbial and Industrial Biochemistry.
- To acquire skills for laboratory experiments.
- To prepare candidates for a career in Pharmaceutical industries, food industries etc.

2. **CONDITION FOR ADMISSION**

A candidate who has passed B.Sc degree in Medical Biochemistry/ Biochemistry/ Microbiology or an Equivalent B, Sc. Examination in Bachelor of Medical Laboratory Course or some other B.Sc board equivalence submitted by the respective University may be accepted by the syndicate as equivalent there to with Biochemistry shall be eligible for admission into M.Sc., course in Medical Biochemistry.

3. **DURATION OF THE COURSE:**

The course for the degree of Master of Science shall consist of two academic years divided into four semesters.
4. **COURSE OF STUDY:**

The course of study for the M.Sc. Degree in the Branch Medical Biochemistry shall comprise the following subjects according to the syllabus,

i) **Major:** Medical Biochemistry

ii) Integrated and Skilled Based Elective Course and Non Major Elective Course subjects

iii) Human Rights (Languages and English)

Non major elective course subjects may be chosen by the respective colleges and the same must be communicated to the University.

**SEMESTER I**

**SEMESTER II**

**SEMESTER III**

**SEMESTER IV**

5. **EXAMINATIONS**

There shall be four examinations- two in the first year, two in the second year. Candidates failing in any subject / subjects will be permitted to appear for such failed subject / subjects at subsequent examinations. The Syllabus has been divided into four semesters. Examinations for I and III semesters will be held in November/ December and for II and IV semesters will be held in April / May.

The practical examination I&II will be held in semester-I. Practical III & IV will be held at the semester-II. Practical- V & VI will be held in semester –III and in semester-IV individual Research Project should be performed and dissertation should be and their report shall be evaluated in viva voce examination conducted before the examiners at the end of IV - semester.

6. **PASSING MINIMUM**

A candidate shall be declared to have passed the examination if he /she secure not less than 50% of the marks in each paper / practical. Candidates who do not secure the required minimum marks for a pass in a paper / practical shall be required to appear for and pass the same at a subsequent appearance. For practical, the minimum for a pass includes the record notebook marks also. There is no passing minimum for the record notebook. However submission of a record notebook is a must.
7. **CLASSIFICATION OF SUCCESSFUL CANDIDATES**

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First Class. All other successful candidates shall be declared to have passed in the Second Class. Candidates who obtain 75% and above in the aggregate shall be declared to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.

8. **RANKING**

Candidates who pass all the examinations prescribed for the course in the first instance and within a period of three academic years from the year of admission to the course only are eligible for University Ranking.

**GRADING SYSTEM**

Evaluation of performance of students is based on ten-point scale grading system as given below

<table>
<thead>
<tr>
<th>Ten Point Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grade of Marks</strong></td>
</tr>
<tr>
<td>90-100</td>
</tr>
<tr>
<td>80-89</td>
</tr>
<tr>
<td>75-79</td>
</tr>
<tr>
<td>70-74</td>
</tr>
<tr>
<td>60-69</td>
</tr>
<tr>
<td>50-59</td>
</tr>
<tr>
<td>00-49</td>
</tr>
<tr>
<td>ABSENT</td>
</tr>
</tbody>
</table>

9. **MAXIMUM DURATION FOR THE COMPLETION OF THE PG PROGRAMME**

The maximum duration for completion of the PG Programme shall not exceed EIGHT semesters.

10. **COMMENCEMENT OF THIS REGULATION**

These regulations shall take effect from the academic year 2017-2018, i.e. for students who are to be admitted to the first year of the course during the academic year 2017-2018 and thereafter.

11. **TRANSITORY PROVISION**

Candidates who were admitted to the PG course of study before 2017-2018 shall be permitted to appear for the examinations under those regulations for a period of three
years i.e. up to and inclusive of the Examination of April/May 2021. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

12. PAPERS GIVEN BY THE BOARD AS NON – MAJOR ELECTIVE COURSE

SEMESTER III

Fundamentals of Human physiology (Or) Biochemistry in Nutrition

SEMESTER IV

Biochemistry in Human Health (Or) Biochemistry in Diagnosis

13. PATTERN OF QUESTION PAPER (FOR MAJOR, ELECTIVE AND EDC)

Maximum – 75 marks

Duration – 3 hours

Section –A (15 x 1 = 15 marks)

Answer all the questions

(Multiple Choice Questions- Two questions from each unit)

Section –B (2x5 = 10 marks)

Answer any two questions

(One question from each unit)

Section –C (3x10 = 50 marks)

Answer all the questions

(Either or Choice-Two questions from each unit)

PATTERN OF QUESTION PAPER (FOR PRACTICAL)

Internal – 40 marks (includes Attendance, Observation and Performance in the laboratory)

External – 60 marks

Question paper should contain two experiments with either or choice. First experiment is Major which has 25 marks and the second experiment is Minor question which has 20 marks. The mark distribution as follows
<table>
<thead>
<tr>
<th>S No</th>
<th>Content</th>
<th>Experiment I</th>
<th>Experiment II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Principle</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Procedure</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Table / Graph</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Observation / Calculation</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Result</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Spotters</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Record</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Viva</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**FOR RESEARCH**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Particulars</th>
<th>Marks</th>
<th>Examiners</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dissertation</td>
<td>30%</td>
<td>Internal Examiner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30%</td>
<td>External Examiner</td>
</tr>
<tr>
<td>2</td>
<td>Viva-voce</td>
<td>20%</td>
<td>Internal Examiner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20%</td>
<td>External examiner</td>
</tr>
</tbody>
</table>

**Program objectives and outcomes**

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

The career perspectives of the Master’s program in Biochemistry are

PEO 1: To prepare students for the future careers in the concerned/various relevant fields in which a core understanding of the chemistry of life is important.

PEO 2: To enable the graduates to exhibit leadership, make life long learners with professional and social ethics and make them communicate effectively.

PEO 3: To add highly skilled scientific workforce in the area of biomedical research sectors, academic, industry as well as for research laboratories across the country and the globe by following best practices for improving the professionalization and employability of students.

PEO 4: The practical and technical skills with laboratory-based work and the final year research project prepare the students for a research or technical position by defining specific and transferable skills.

PEO 5: To sensitize and train the students towards research with typical employers include pharmaceutical, biotechnology, food, water and agricultural companies and specialist services, such as toxicological studies.
PEO 6: To train the students in generic and competency skills so as to be able to work in potential places including scientific and medical publishers and the Intellectual Property Office

PROGRAMME SPECIFIC OBJECTIVES (PSOs)

The Overall objective of the Program is to promote education and research in biochemistry and provide academic and professional excellence for immediate productivity in industrial, or clinical settings for an ultimate benefit of society and environment.

<table>
<thead>
<tr>
<th>PSO1:</th>
<th>To acquire necessary knowledge and skills in core themes, principles and components of basic Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSO2:</td>
<td>To demonstrate the knowledge of biochemical processes from the cellular and molecular aspects</td>
</tr>
<tr>
<td>PSO3:</td>
<td>To Integrate and apply the techniques studied and to compare and contrast the depth of scientific knowledge in the broad range of fields</td>
</tr>
<tr>
<td>PSO4:</td>
<td>to be able to understand, analyze and apply the studied basic and concepts in wide variety of applications including diagnostics, biochemical pathway regulation and drug development and use this knowledge and apply the same for multitude of laboratory applications.</td>
</tr>
<tr>
<td>PSO5:</td>
<td>To provide students with the knowledge and skill base that would enable them to go for self-employment and entrepreneurship</td>
</tr>
</tbody>
</table>

PROGRAMME OBJECTIVES (POs)

PO1: To demonstrate comprehensive knowledge on various areas of Biochemistry. PO2: To acquire skills in areas related to the current and emerging developments.

PO3: To communicate the concepts, constructs and techniques of the subject learnt in a clear, concise and lucid manner.

PO4: To plan and execute the experiments to the relevant theories of Biochemistry.

PO5: To apply critical thinking, scientific reasoning and mathematical skills in studied areas of Biochemistry.
PO6: To train the students to acquire various relevant generic and competency skills in various aspects of biochemistry so as to be able to work independently in a group or individually.

PO7: To make a student life long learner with moral and ethical values.

PROGRAMME OUTCOME (PO’S):

M.Sc programme in Biochemistry will provide students with the necessary knowledge and skills to undertake a career in research, either in industry or in an academic setting. The training provided will give students the breadth and depth of scientific knowledge in Biochemistry. On completion of the programme, students will be qualified to apply for a PhD or to gain employment in the pharmaceutical or biotechnology industries, which are among the strongest growth sectors. The programme will be based on a combination of taught modules, independent learning and an extended research project to be carried out either in the University departments or industry or in association with industry at the University. The programme incorporates a substantial element of hands-on research experience, with enhanced experimental skills being gained alongside experienced research workers.

It is intended that, on successful completion of the M.Sc degree programme, students will:

1. **be capable of demonstrating comprehensive knowledge** and have a fundamental/systematic or coherent understanding of major concepts, theoretical principles and experimental findings in biochemistry.

2. **acquire skills in areas related to the current and emerging developments** in the field of Biochemistry.

3. **be identifying and applying appropriate biochemical principles** and methodologies to solve a wide range of problems associated with Biochemistry.

4. **communicate the results of studies undertaken** in Biochemistry accurately in a range of different contexts using the main concepts, constructs and techniques of the subject learnt in a clear and concise manner in writing and oral skills.

5. **Plan and execute the experiments**, investigate, analyze and interpret data collected using appropriate experimental methods, and report the findings of the experiment and relate the interpretations and conclusions to relevant theories of Biochemistry.

6. They will have the **ability to employ critical thinking, scientific reasoning and efficient problem solving** skills in the basic areas of biochemistry.

7. Be able to **demonstrate relevant generic skills and competencies** such as (i) problem solving skills, (ii) investigative skills, (iii) communication skills (iv) analytical skills, (v) ICT skills, (vi) skills such as the ability to work both independently and in a group.

8. **demonstrate professional behaviour** such as (i) unbiased and truthful in all aspects of work (ii) follow moral and ethical practices (iii) Life long learners aimed at personal development and for improving knowledge/skill development (iv) focusing on issues related to social cause.
Credit calculation

<table>
<thead>
<tr>
<th>S. No</th>
<th>Method of teaching</th>
<th>Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Tutorial/demonstration</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Practical/Internship/ Self-Learning</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
## COURSE OF STUDY AND SCHEME OF EXAMINATION

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Subject</th>
<th>Subject Title</th>
<th>Instruction Hrs / Week</th>
<th>Exam Hours</th>
<th>University Examination Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Internal (25%)</td>
<td>External (75%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### I SEMESTER

1. Core I
   CHEMISTRY OF BIOMOLECULES
   
   Instruction: 5
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

2. Core II
   BIOCHEMICAL TECHNIQUES
   
   Instruction: 5
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

3. Core III
   CELLULAR BIOCHEMISTRY
   
   Instruction: 5
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

4. Elective I
   HUMAN ANATOMY AND PHYSIOLOGY
   
   Instruction: 5
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

5. Core Practical I
   LAB COURSE - I
   
   Instruction: 5
   Exam Hours: 6
   University Examination: 40, 60, 100
   Credits: 4

6. Core Practical II
   LAB COURSE - II
   
   Instruction: 5
   Exam Hours: 6
   University Examination: 40, 60, 100
   Credits: 4

### II SEMESTER

1. Core IV
   BIOENERGITICS AND INTERMEDIARI METABOLISM
   
   Instruction: 5
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

2. Core V
   CLINICAL ENZYMÖLOGY
   
   Instruction: 4
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

3. Core VI
   ADVANCED ENDOCRINOLOGY
   
   Instruction: 5
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

4. Elective II
   MEDICAL MICROBIOLOGY
   
   Instruction: 4
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 4

5. Common Paper
   HUMAN RIGHTS
   
   Instruction: 2
   Exam Hours: 3
   University Examination: 25, 75, 100
   Credits: 2

6. Core Practical III
   LAB COURSE - III
   
   Instruction: 5
   Exam Hours: 6
   University Examination: 40, 60, 100
   Credits: 3

7. Core Practical IV
   LAB COURSE - IV
   
   Instruction: 5
   Exam Hours: 6
   University Examination: 40, 60, 100
   Credits: 3
Note: Online Course certificate (SWAYAM/NPTEL) should be submitted to the Institution at the end of third semester (Compulsory)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Subject</th>
<th>Subject Title</th>
<th>Instruction</th>
<th>Exam Hours</th>
<th>University Examination</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Internal</td>
<td>External</td>
</tr>
<tr>
<td>III SEMESTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Core VII</td>
<td>IMMUNOLOGY</td>
<td>4</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>Core VIII</td>
<td>PHARMACEUTICAL BIO - CHEMISTRY AND TOXICOLOGY</td>
<td>4</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>3</td>
<td>Core IX</td>
<td>CLINICAL AND NUTRITIONAL BIOCHEMISTRY</td>
<td>4</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>Elective III</td>
<td>BIOSTATISTICS &amp; MEDICAL BIOINFORMATICS</td>
<td>4</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td>EDC</td>
<td>CHOICE OF PAPER SELECTED BY THE COLLEGE OR DEPARTMENT</td>
<td>4</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>6</td>
<td>Core Practical V</td>
<td>LAB COURSE - V</td>
<td>5</td>
<td>6</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>Core Practical VI</td>
<td>LAB COURSE - VI</td>
<td>5</td>
<td>6</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>IV SEMESTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Core X</td>
<td>BIOMEDICAL INSTRUMNTATION</td>
<td>5</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>Elective IV</td>
<td>MOLECULAR BIOLOGY AND BIOTECHNOLOGY</td>
<td>4</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>3</td>
<td>Project</td>
<td></td>
<td></td>
<td></td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| University Examination | 2300 |

<p>| Credits | 90 |</p>
<table>
<thead>
<tr>
<th>Subject</th>
<th>Total Marks</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Of Core paper/ Practical/ project [16]</td>
<td>1700</td>
<td>69</td>
</tr>
<tr>
<td>Elective - Major: [04]</td>
<td>400</td>
<td>15</td>
</tr>
<tr>
<td>Non-Major Supportive course - EDC and Human rights [2]</td>
<td>200</td>
<td>06</td>
</tr>
<tr>
<td>Grand Total</td>
<td>2300</td>
<td>90</td>
</tr>
<tr>
<td>S. No</td>
<td>Type of paper</td>
<td>Title of the subject</td>
</tr>
<tr>
<td>-------</td>
<td>---------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Core I</td>
<td>CHEMISTRY OF BIOMOLECULES</td>
</tr>
<tr>
<td>2.</td>
<td>Core II</td>
<td>BIOCHEMICAL TECHNIQUES</td>
</tr>
<tr>
<td>3.</td>
<td>Core III</td>
<td>CELLULAR BIOCHEMISTRY</td>
</tr>
<tr>
<td>4.</td>
<td>Elective I</td>
<td>HUMAN ANATOMY AND PHYSIOLOGY</td>
</tr>
<tr>
<td>5.</td>
<td>Core Practical I</td>
<td>LAB COURSE - I</td>
</tr>
<tr>
<td>6.</td>
<td>Core Practical II</td>
<td>LAB COURSE - II</td>
</tr>
<tr>
<td>7.</td>
<td>Core IV</td>
<td>BIOENERGITICS AND INTERMEDIARY METABOLISM</td>
</tr>
<tr>
<td>8.</td>
<td>Core V</td>
<td>CLINICAL ENZYMEOLOGY</td>
</tr>
<tr>
<td>9.</td>
<td>Core VI</td>
<td>ADVANCED ENDOCRINOLOGY</td>
</tr>
<tr>
<td>10.</td>
<td>Elective II</td>
<td>MEDICAL MICROBIOLOGY</td>
</tr>
<tr>
<td>11.</td>
<td>Common Paper</td>
<td>HUMAN RIGHTS</td>
</tr>
<tr>
<td>12.</td>
<td>Core Practical III</td>
<td>LAB COURSE - III</td>
</tr>
<tr>
<td>13.</td>
<td>Core Practical IV</td>
<td>LAB COURSE - IV</td>
</tr>
<tr>
<td>14.</td>
<td>Core VII</td>
<td>IMMUNOLOGY</td>
</tr>
<tr>
<td>15.</td>
<td>Core VIII</td>
<td>PHARMACEUTICAL BIO - CHEMISTRY AND TOXICOLOGY</td>
</tr>
<tr>
<td>16.</td>
<td>Core IX</td>
<td>CLINICAL AND NUTRITIONAL BIOCHEMISTRY</td>
</tr>
<tr>
<td></td>
<td>Course Code</td>
<td>Course Title</td>
</tr>
<tr>
<td>---</td>
<td>-------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>17</td>
<td>Elective III</td>
<td>BIOSTATISTICS &amp; MEDICAL BIOINFORMATICS</td>
</tr>
<tr>
<td>18</td>
<td>EDC</td>
<td>CHOICE OF PAPER SELECTED BY THE COLLEGE OR DEPARTMENT</td>
</tr>
<tr>
<td>19</td>
<td>Core Practical V</td>
<td>LAB COURSE - V</td>
</tr>
<tr>
<td>20</td>
<td>Core Practical VI</td>
<td>LAB COURSE - VI</td>
</tr>
<tr>
<td>21</td>
<td>Core X</td>
<td>BIOMEDICAL INSTRUMNTATION</td>
</tr>
<tr>
<td>22</td>
<td>Elective IV</td>
<td>MOLECULAR BIOLOGY AND BIOTECHNOLOGY</td>
</tr>
<tr>
<td>23</td>
<td>Project</td>
<td></td>
</tr>
</tbody>
</table>
M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER I

<table>
<thead>
<tr>
<th>Course Name: Chemistry of Biomolecules</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: 21PMB01</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Marks : Internal – 25 External – 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paper Type: Core I</td>
</tr>
</tbody>
</table>

OBJECTIVE

❖ To study the structure and functions of macromolecules

UNIT – I


UNIT – II


Peptide bond: Structure and significance of peptide bond, amino acid sequencing (Sanger’s and Edman methods).

Protein structure: Levels of structure in Protein Architecture, Primary structure of proteins (Eg.Insulin), Secondary structure of proteins – helix and pleated sheets (eg.Collagen), Tertiary structure of proteins (Eg. Myoglobin), Quaternary structure of proteins (Eg. Hemoglobin) other Forces and weak bonds stabilizing the Protein structure.

UNIT – III

Lipids : Definition, Classification and Biological role of lipids

Simple lipids - Properties and Characterization of fats – Hydrolysis, Saponification, Halogenation, Acetyl number, Rancidity of fats, Reichert-Meissel number, Compound lipids - Structure and function of phospholipids (Lecithin, Sphingomyelin Cephalin, Phosphatidyl Inositol and Phosphatidylserine) and Glycolipids (Gangliosides and Cerebrosides). Derived lipids - Classification, structure and properties of saturated and unsaturated fatty acids; Essential and Non essential fatty acids.
Sterols – Structure, Function and Properties of Cholesterol, Bile acids [no structure], and lipoproteins biological production and significance. Eicosanoids, Prostaglandins, Thromboxanes, Leukotrienes,

Nucleic acids Structure of Purines and Pyrimidines; Unusual bases (5-Bromouracil, Pseudouridine, Inosine, Dihydroxyuridine, Methylcytosine); Nucleosides and nucleotides – structure and functions. Chemical and enzymatic sequencing methods.

DNA – Watson & Crick Model, A, B and Z forms of DNA. Properties of DNA - buoyant density, viscosity, chromic effect, Tm, denaturation, renaturation, hybridization and Cot analysis. Chemical properties

Major classes of RNA – mRNA, rRNA, tRNA, snRNA, hnRNA – structure and biological functions.

UNIT – V


REFERENCE BOOKS

5. Principles of Biochemistry, Garrette & Grisham, 1994, Saunders college publishing

Course Outcome:

1. To explain about the structure, properties and functions of polysaccharides
2. Illustrate on structure, properties and functions of lipids, interactions of lipids in biological membrane.
3. Determine the classification, properties and significance of proteins
4. Explain about the DNA properties and functions, biological importance of histone
5. To determine the significance of vitamins and its antioxidant activity, minerals of biological significance
M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER I

Course Name: Biochemical Techniques

<table>
<thead>
<tr>
<th>Course code: 21PMB02</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Total Marks : Internal – 25 External – 75

Paper Type: Core II

COURSE OBJECTIVES:

This course focuses on the biochemical techniques including spectrophotometry, centrifugation, electrophoresis, radioactivity etc. Learning these techniques will be very useful for operating instruments and become the basic knowledge in their future.

UNIT I

pH scale: buffer solution, pH electrode, Clarke's Oxygen electrode and their applications.

Microscopy: Principles and applications of light, phase contrast, fluorescence, scanning and transmission electron microscopy. Principles, preparation of specimens for TEM and SEM.

Organ and tissue slice technique, cell disruption and homogenization technique, Microtomy – Staining and fixation. Cell sorting and cell counting of various tissue culture collections. Cryopreservation and manometric techniques.

UNIT II

Chromatography: Principles, Instrumentation and applications of paper chromatography, exclusion chromatography, column chromatography, Chromatofocussing affinity chromatography and adsorption chromatography: Gel preparation, principle and application ion-exchange chromatography – Types of resins, apparatus preparation and application.

Liquid chromatography: Principle, Instrumentation and applications of GLC, LC, LPLC and HPLC.

UNIT III

Electrophoresis: Principles, Instrumentation and applications of paper electrophoresis, agar gel, starch gel, PAGE, Capillary electrophoresis PFGE, high and low voltage electrophoresis, Isoelectric focussing, Tachophoresis.

UNIT – IV


Basic principles, instrumentation and applications of UV and visible light spectrophotometry, spectro fluorimetry, Atomic Flame Photometry, Plasma Emission Spectroscopy, Infra–red spectrophotometry, Mass spectrometry, Tandem mass spectroscopy, ESR, NMR,

UNIT - V

Tracer techniques: Radioactive isotopes and half life of isotopes, Principles and applications of tracer techniques in biology and medical sciences, measurement of alpha, beta and gamma radiations. Radiation dosimeter, Autoradiography; Principle, Biological applications. Geiger Muller Counter and Liquid Scintillation counter.

REFERENCES:


6. Tools of Biochemistry David Cooper.

7. Computational Biochemistry C. Stan Tsai.

Course Outcomes:

1. Understand the working principles, construction and applications of electrochemical techniques related to various aspects of biological sciences.

2. Describe the techniques and applications of chromatography for biological sample separation.

3. Recognize how the centrifugation plays a role in separation of sample with different molecular weight.

4. Have a clear picture of radioisotopes, radioactivity, decay patterns, tracer techniques and use of isotopes in biological studies.
5. Study the principles, mechanism and applications of various Electrophoretic techniques in research and industrial level.

6. Understand the law of absorption spectrum, principle and mechanism of UV visible spectrophotometry, ESR, NMR, IR, spectrofluorimetry, turbidimetry, nephelometry and luminometry, thereby learn its applications in research level.
M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER I

<table>
<thead>
<tr>
<th>Course Name: Cellular Biochemistry</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: 21PMB03</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Marks : Internal – 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External – 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper Type: Coe III</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURSE OBJECTIVES:

To Know about tissue types, organization and classes of cell junctions and describe the role of cell adhesion molecules and ECM components. Understand what happens during the cell cycle and cell death and explain about membrane transports and checkpoints in the cell cycle.

UNIT I

Origin of single cell – theories and concepts. Cell cycle: Prokaryotic and eukaryotic cell cycle, cell growth and extracellular signal molecular basis of cell cycle regulation, cell cycle check points, cyclin and cyclin dependent kinases, Apoptosis: Survival and death facts cell death receptors, cell – cell interactions in cell rescue and death, erythropoietin in RBC development. Molecular apoptotic events in C. elegans and mammals, bcl family of proteins, caspas, significance of apoptosis

UNIT-II


Kinetochore architecture and spindle assembly focal adhesion points,. Major types of cell adhesion molecules (CAMs) – Cadherin, Integrins, Selectins and super family Immunoglobulin

UNIT-III

Cell– cell communication: Autocrine, paracrine, endocrine, juxtacrine communication. Nitric oxide and paracrine factors involved in communication EGF’s Hedgehog family, Wnt family, TGF, beta super family, BMP family, signal transduction pathways: G protein, cAMP pathway, IP3 pathway, RTK pathway, MAP kinase pathway. Major classes of cell junctions anchoring, Gap, tight junctions

UNIT IV

Composition of Cell membrane: Lipid Bilayer, Peripheral and Integral proteins. Fluid mosaic model. Membrane transport types: Uniport, Synport, Antiport. Active transport: P-
types[Na+K+ATPases, F-Type ATPases (ATP synthetases), Ionophores, Ion channels and ligand/voltage gated channels

Protein sorting: Golgi and endoplasmic reticulum and lysosome complex in protein targeting, signal recognition particles – chaperons and protein folding. GPI anchoring, targeting of proteins to mitochondria, protein glycosylation and post translational modification, vesicular transport and secretory pathways.

UNIT V


REFERENCE BOOKS

4. Cell and Molecular Biology by EDP De Robertis and EMF De Robertis
5. Principles of Cell Biology by Klein Smith and M Kish

Course Outcome:

1. Know about tissue types, organization and classes of cell junctions and describe the role of cell adhesion molecules and ECM components.
2. Understand what happens during the cell cycle and cell death and explain about membrane transports and checkpoints in the cell cycle.
3. To understand the basic structures, properties and organisation of eukaryotic and prokaryotic chromosomes.
4. Pertain on Overview of cell cycle, cell growth, tumors, cancers and isolation techniques
5. Describe on carcinoigenesis
COURSE OBJECTIVES:

To study the mechanism of human body systems and mode of action of Hormones

UNIT I

HUMAN ANATOMY:

Overview of Anatomy – Medical and Anatomical terminology – Sections of the body – Anatomical Variations – Organization of the body cells, Tissues.

Introduction to Systemic Anatomy – Types of bone – Joints – Classification of joints – innervations of joints – Muscle tissue and muscular system – Types of Muscles Anatomical structure of Liver, Kidney and stomach

UNIT II

Cardiovascular system:


Heart sounds - Cause, characteristics and significances. Cardiac rhythm and tachycardia

UNIT III

Respiratory system: Diffusion of gases in lungs, transport of oxygen from lungs to tissues via blood, factors influencing the transport of oxygen. Transport of CO2 from tissues to lungs through blood, factors influencing the transport of CO2.

Excretory System: Mechanism of formation of urine, composition of urine, Micturition.

Renal regulation of acid balance, Mechanism of tubular reabsorption and excretion of urine. Influence of hormone in kidney function.
UNIT IV

**Digestive system:** Secretion of digestive juices, digestion and assimilation of Carbohydrates, Proteins Fats and vitamins. Gastro intestinal hormones.

**Nervous system:** Structure of neuron, resting potential and action potential, Propagation of nerve – impulses, Structure of synapse, synaptic transmission (electrical and chemical theory). Structure of Neuro muscular junction and mechanism of neuro muscular transmission, Second messengers, Neuro transmitters.

UNIT V

**Reproductive systems**

Function of reproductive system. Male reproductive system - functions of testis, spermatogenesis site and stage factors influencing semen, Endocrine functions of testis, Androgens - Testosterone - structure and functions.

**Female Reproductive system** - Ovulation, Menstrual cycle, physiological changes during pregnancy - Actions of oestrogen, progesterone, functions of placenta.

**Lactation** - Composition of milk and factors controlling lactation

**REFERENCE BOOKS**

2. Text book Medicinal Chemistry, Chatterjee, C.
3. Text book of human physiology, Saradha Subramaniam
5. Agarwal physiological T.B. of Biochemistry, Agarwal G.R & Agarwal B.P. Chemistry.
8. Concise human physiology, Sukkar, M.Y.Munshid and Ardawi
9. Review of Medical Physiology Gaanong W.F

**Course Outcomes:**

1. To understand the fundamental mechanisms of body fluids and blood cells.
2. Illustrate the circulatory system includes heart structure, cardiac cycles and cardiac factors and respiratory system includes anatomy, physiology, gas exchange and explain the role of lungs in acid base balance.
3. Learn about the anatomy of digestive system and secretions, composition and functions of gastric and biliary system thereby learn how to digest the biomolecules in intestine.

4. Describe the structure and functions of kidney and muscle. Explain mechanism and theories of muscle contraction.

5. Recognize the role of central nervous system in human body. Study the functional units, chemical composition and metabolism of brain.
Course Name: Lab Course I

<table>
<thead>
<tr>
<th>Course code: 21PMBP01</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Marks: Internal – 25  External – 75  
Paper Type: Practical I

1. Microscopy
2. Staining Techniques [Morphological observation only]
3. Microtomy
4. Histochemical Techniques
5. Mitosis and Meiosis
6. Cell Fractionation
7. General Reactions of Carbohydrates, Lipids, Amino acids and Proteins
8. Iodine Value, Acid Value and Saponification Value
9. Estimation of Vitamin A and Vitamin C
10. Preparation of Cholesterol from Brain

REFERENCE BOOKS

1. Laboratory techniques in Biochemistry and Molecular Biology, Work and Work.
Course Name: Lab Course II

Course code: 21PMBP02

<table>
<thead>
<tr>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Marks: Internal – 25  External – 75  Paper Type: Practical II

1. Analyse the following contents in the selected food sample Calories, Crude fibre and Dietary fibre, Moisture, Nitrogen, Ash calcium, phosphorus, iron, carotene, thiamine, riboflavin, fat, protein

2. Estimation of amino acids

3. Separation of amino acids and sugars by paper chromatography (Ascending, Descending, and Circular)

4. Separation of Protein Hb, Cytochrome C by Molecular sieve chromatography

5. Separation of amino acids by Paper Electrophoresis

6. Separation of Serum Protein by SDS PAGE

7. Separation of DNA by AGE

REFERENCE BOOKS

1. Laboratory techniques in Biochemistry and Molecular Biology, Work and Work.


COURSE OBJECTIVES:

The Course aims to understand the major metabolic pathways involved in synthesis and degradation of biomolecules and energy generation

UNIT I

**Bioenergetics:** Energy transformation, Laws of thermodynamics, Gibbs energy, Free energy changes and redox potential, ATP as Energy Currency of cells, High and low energy compounds – Electron transport chain, Oxidative phosphorylation, Inhibitors and Uncouplers of ETC, shuttle systems.

UNIT II

**Carbohydrate Metabolism**

Introduction to metabolism of cells, glycolysis and its regulation, citric acid cycle, its function in energy generation and regulation of TCA cycle, Gluconeogenesis and its regulation, Metabolism of glycogen and its regulation. Hexose Monophosphate Pathway, Uronic acid pathway, Cori cycle, Metabolism of other hexoses – Fructose, Galactose. Hormonal influence and regulation of Carbohydrate metabolism.

UNIT III

**Lipid Metabolism**

Biosynthesis of Fatty acid - Palmitic acid, Stearic acid, Oleic acid, linoleic acid and Arachidonic acid, Oxidation of saturated and unsaturated fatty acids. Oxidation of fatty acids - alpha, beta and omega oxidation in even and odd numbered fatty acids. Metabolism of Triacyl glycerol, phospholipids and sphingolipids. Cholesterol biosynthesis and regulation. Catabolism transport and excretion of cholesterol, lipoprotein metabolism. Ketone bodies formation and utilization.

UNIT IV

**Aminoacid Metabolism**

Biosynthesis and Degradation of Tryptophan, Phenylalanine, Lysine, Methionine and

UNIT V

Nucleotide Metabolism

Purine nucleotides Metabolism: de novo synthesis, salvage pathway and catabolism with energetics.

Pyrimidine nucleotides Metabolism: de novo synthesis, salvage pathway and degradation of pyrimidine nucleotides. Regulation of Purine and Pyrimidine nucleotide metabolism. Synthesis tRNA, rRNA and mRNA with regulation.

REFERENCE BOOKS


Course Outcomes:

1. Understand the energy transformation and chemical logic of metabolic pathways in living organism.
2. Know in detail about enzymes, redox carriers, ETC and oxidative phosphorylation machinery.
3. Recognise carbohydrate metabolism and its various biochemical processes responsible for the formation, breakdown and interconversion of carbohydrates in living organisms.
4. Describe what happens in the lipid metabolism, fatty acid oxidation, cholesterol synthesis and degradation as well as in ketogenesis and plasma lipoproteins.

5. Describe what happens during protein, nucleic acid and porphyrin metabolism
M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER I

<table>
<thead>
<tr>
<th>Course Name: Clinical Enzymology</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: 21PMB05</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Marks : Internal – 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External – 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper Type: Core V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURSE OBJECTIVES

This paper aims to provide a basic understanding of biological catalysis, Mechanism of action of enzymes, structure and function relationship, Understanding the enzyme kinetics and role of coenzymes/co-factors and an overview of Industrial application of enzymes

UNIT I

IUB system of classification and nomenclature, Enzyme units , Active site, Enzyme Kinetics-Activation energy, Derivation of Michaelis Menten equation, Factors affecting enzyme activity, Enzyme assay, Coenzymes, Isoenzymes and mutlienzyme complex, Mechanism and regulation of enzyme action- Allosteric and feedback regulation.

UNIT II

Principles of Diagnostic enzymology – Laboratory investigation of serum and urinary enzymes, Intracellular localization of enzymes, Diagnostic and Prognostic importance of plasma and non plasma specific enzymes. Cytosolic enzymes – SGPT,ALP and Myocardial isoenzymes LDH, CPK – their source, properties, function, normal value, diagnostic importance. Significance of enzymes in bone disorder and muscle wasting

UNIT III


UNIT IV


UNIT V

Enzymes in Medicine and diagnosis. Normal and Abnormal value of diagnostic marker enzymes, Enzymes in detoxication of drug metabolism, Enzymes in diagnosis: Cerebrospinal
fluid, Amniotic fluid and Biopsy samples. Antioxidant enzymes – SOD, Catalase, GPX and GR. Therapeutic enzymes: Thrombolytic enzyme, wound healer, erythropoiesis stimulator

REFERENCE BOOKS

4. Protein Biotechnology, Gary Walsh and Denis Headon, 1994. John Wiley and Sons,
5. Protein Biochemistry and Biotechnology, Gary Walsh,2002, John Wiley and Sons Ltd.
6. Enzyme kinetics and Mechanism –Paul F.Cook

Course outcomes

After the completion of this course, the student will be able to

1. Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and Compare methods for production, purification, characterization of enzymes
2. To understand the diagnostic importance of enzymes and their significances.
3. Know about the clinical significance of the enzymes
4. Describe the enzymes involved in the inborn error of metabolism
5. To understand the importance of Enzymes in Medicine and diagnosis
OBJECTIVE

❖ To study about the functions, mechanism of action, diagnosis and investigations of hormones

UNIT – I

Hormones - Introduction, classification, hormonal effects and regulation – basic concepts
Chemical properties of hormones: Peptide hormones, Steroid hormone, Neurohormone.
Concept of Receptors – Cell surface and intracellular (cytoplasmic and nuclear) receptors, G protein coupled receptors, Pharmacological receptors – Neurotransmitter receptors. Second messenger system – Ca+: cAMP, cGMP, DAG, and IP3.

UNIT – II

Chemical nature and mechanism of action of steroid hormones and glycoprotein hormones on target tissues. Hypothalamus, Pituitary- Posterior and Anterior, Thyroid, parathyroid, Adrenal and Pineal glands: Secretions, Structure, physiology and Mechanism of action.

UNIT- III


UNIT- IV

Secretions, Structure, physiological function, Mechanism of action, Dysfunction and pathophysiology of hypothalamus – Posterior and anterior hypophyseal complex. Dysfunction and pathophysiology of thyroid, parathyroid, pancreas, adrenals, gonads and gastrointestinal hormones.

UNIT-V

Endocrine system: Laboratory diagnosis and investigations related to the disorders of Hypothalamus- Hypophyseal complex. ELISA, [All types] PCR Techniques with reference to
hormones estimation in biological sample: Insulin, T3 and T4. TSH. FSH, LH GH, EGN, PGN.

REFERENCE BOOKS


Course outcome

1. Determine the classification and mechanism of action of hormones.

2. Explain about the chemistry, synthesis and significance of hypothalamic, pituitary and thyroid hormones.

3. Analyze about the pancreatic hormones, gastrointestinal and sex hormones

4. Predict the dysfunction of hypothalamus, parathyroid, pancreas, adrenals, gonads and gastrointestinal hormones.

5. Report on laboratory diagnosis and investigations of hormones
**M.Sc. MEDICAL BIOCHEMISTRY**

**SEMESTER II**

<table>
<thead>
<tr>
<th>Course Name: Medical Microbiology</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: 21PMBE02</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Marks : Internal – 25</td>
<td>Paper Type: Elective II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External – 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COURSE OBJECTIVES:**

The aim of the study is to get knowledge about microorganisms and their characters. Gain knowledge about the medical applications of microorganisms.

**UNIT I**


**UNIT - II**

**Medical Bacteriology**

Morphology, cultural characters, antigenic characters, pathogenicity, laboratory diagnosis, treatment and control of diseases caused by Staphylococcus aureus, Streptococcus pyogenes, Streptococcus pneumoniae, Neisseria meningitidis, Neisseria gonorrhoeae, Clostridia, Salmonella typhi, Shigella dysenteriae, Vibrio cholerae, Mycobacterium tuberculosis, Antibacterial antibiotics – mode of action.

**UNIT - III**

**Medical Mycology**


**UNIT – IV**

**Medical Parasitology**


UNIT – V

Medical Virology


REFERENCE BOOKS


Course Outcomes:

1. Understand the classification and controlling of microbes and study isolation of microbes and maintenance.

2. Describe important characteristic of microorganisms, thereby identify different type of microorganisms.

3. Study about various types of microorganisms involved in infection of food products.

4. Recognise the sources and transmission of infections and how the factors involving in infection.

5. Know about the different types of microscopes and its function.
I. Assay of Enzymes

1. Isolation, purification, and kinetics of ALP and ACP in animal sample

2. Determination of activity of enzymes: LDH, AST, ALT, CK, Phosphatase (Spectrophotometric method) and Antioxidant enzymes [CAT, SOD, GPx, GR].

3. Separation of LDH isozymes in PAGE from serum/Liver

4. Kinetic studies of Amylases and Acid phosphatase

II. Endocrine function tests

1. Assay of Insulin by ELISA

2. Estimation of urinary excretion of VMA, 5-HIAA, 17 - ketosteroids, Catecholamines and Cortisol

3. Estimation of bilirubins and hepato-biliary function tests

4. Thyroid function tests – T3 and T4 Assay

5. Analysis of gastric juice


REFERENCE BOOKS


4. Enzyme structure and mechanism, Aln Fersht, 1997, Reading, USA

Course Name: Lab course IV

<table>
<thead>
<tr>
<th>Course code: 21PMBP04</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Marks: Internal – 25  External – 75  Paper Type: Practical IV

1. Bacterial Staining techniques – Simple, Gram, Acid fast, Endospore, Capsule, granule and Metachromatic staining.

2. Motility Test – Hanging drop method

3. Biochemical identification of bacteria – Catalase test, Oxidase test, IMViC test, TSI, Urease and carbohydrate fermentation tests


5. Gram Staining and Germ tube test of Candida albicans

6. Lugol's iodine mount – Cysts - Entamoeba histolytica, Entamoeba coli, Giardia lamblia

7. Eggs – Ascaris lumbricoides

8. Blood smear examination – Plasmodium/Microfilariae (Demo)

9. Antibiotic sensitivity test – Kirby Bauer method

10. ELISA – HIV and HBs

11. Viral Haem-agglutination Assay

12. ASO test

13. WIDAL Test

14. RPR Test

**REFERENCE BOOKS**

1. Microbiology laboratory Manual., Sundararaj T.Mrs. AswathySunararaj, No 5, 1st Cross Street, Thirumalainagar, Perungudi, Chennai - 96

3. Myer's and Koshy's Manual of diagnostic procedures in medical microbiology and Immunology/serology. Published by Department of Clinical Microbiology. CMC and Hospital, Vellore, Tamil Nadu


OBJECTIVES:

To study the immune responses of human body against antigen, immunological techniques and vaccine synthesis.

UNIT I


UNIT II


UNIT III

Organization and functions of MHC, structure of MHC molecules, Antigen processing and presentation. Classes of MHC molecules. Hypersensitive reactions [all types]. Immune response to infectious diseases. Transplantation types, MHC antigens in transplantation, Mechanism of graft rejection and Immunosuppressive therapy. Autoimmunity and Immuno-deficiency diseases; types, mechanism of HIV organization and pathogenesis

UNIT-IV

Oncogenes, tumour antigens and cancer induction, metastasis, immune response to tumour, cancer immunotherapy. Immunization – Active and passive Immunization, types of vaccine and vaccine technology; Peptide vaccine, toxoids, Recombinant vector vaccine, DNA vaccine, Synthetic peptide vaccine. Hybridoma techniques- HAT media, Production of monoclonal and polyclonal antibodies. Gene transfer into mammalian cells – cultured cells and mouse embryos
UNIT-V


REFERENCE BOOKS

1. Kuby Immunology, Thomas J. Kindt, Richard A Goldsby, 2013. 7th Edn., Publisher W H Freeman & Co
4. The Immune System, Peter Parham, 2014. Publisher Garland publishing
5. Cellular and Molecular Immunology. Abbas et al., 2011. Elsevier

Outcomes:

1. Understand the humoral and cell mediated immunity.
2. Know the primary and secondary lymphoid organ.
3. Describe the theories of antibody formation and factors influencing antibody production.
4. To learn the types of transplantation and understand how its malfunction linked with autoimmune disease and hyper sensitivity.
5. Understand the active and passive immunization and learn how to make recombinant vector vaccines.
6. Clear knowledge about the agglutination and precipitation techniques involved in research level.
COURSE OBJECTIVES:

This course deals with the study of fundamental concepts of pharmacology about the physicochemical properties of the drug, their origin, classification and nomenclature of drugs, how do they act, etc., It also enables the students to gain the complete knowledge about drug designing and also know about the principles of toxicology.

UNIT I


UNIT II


UNIT III


UNIT IV

Drug conjugation pathways- Phase – II: Hyaluronic acid conjugation – sulfate conjugation – conjugation with amino acids; Acetylation, Glutathione conjugation, cyanide conjugation.

UNIT V


REFERENCE BOOKS


Course Outcome:

- Students who complete this course will be able to:
  - Understand clearly about the basic concepts of pharmacology
  - Have a thorough knowledge about the mechanism of drug action, Drug interaction, Receptors.
  - Know the aspects of New discovery of drugs and drug designing.
  - Recognize the principles of toxicology, Antidotes and the management of poisoning.
M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER III

<table>
<thead>
<tr>
<th>Course Name: Clinical and Nutritional Biochemistry</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: 21PMB09</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Marks : Internal – 25 External – 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Paper Type: Core IX

OBJECTIVES:

- The aim of the study of this paper is clinical approach of blood and urine samples and their complications.

- To gain the knowledge about neutraceuticals

UNIT I

Uses of Biochemical data in clinical medicine- specific uses of biochemical tests in management and prognosis-screening. Acquisition & Interpretation of biochemical data-Factors affecting test results-Pre-analytical factors-Biological factors – Endogenous & Exogenous– Accuracy–Precision and Analytical goal.


Specimen: Whole blood, plasma, serum, CSF and gastric fluid collection methods and preservation

UNIT II


Disorders of lipid metabolism: Familial hypercholesterolemia, hypo and hypercholesterolemia, Fatty liver, Hyper and hypo lipoproteinemia, hypertriglyceridemia, Atherosclerosis and Myocardial Infarction – Biochemical changes, Diagnosis, prognosis and management.

Disorders of Nitrogen metabolism: Excretion of nitrogenous waste products, porphyrias, Hemoglobinopathies, Uricaciduria- Pathogenesis, diagnosis and management.
UNIT III

Liver function tests: Based on abnormalities of bile pigment metabolism, changes in plasma proteins, excretion, detoxification. Role of serum enzymes in diagnosis of liver diseases. Management of jaundice, hepatitis, cirrhosis, liver failure, hepatic coma and gall stones.

Kidney function tests: Abnormal constituents of urine, biochemical findings, Glomerular and tubular function tests. Pathogenesis, Biochemical changes, diagnosis and prognosis: Nephrotic syndrome, Glomerular nephritis, kidney failure, Urolithiasis and nephrolithiasis.

Gastric functional tests: Fluid composition, pathology, diagnosis and management of Ulcer [all types] and gastritis. Tumor markers and molecular significances; Oncofetal protein, Oral carcinoma, mammary carcinoma, liver carcinoma, Kidney cancer, leukemia-Acute and Chronic Lymphoid Leukemia and Myeloid Leukemia

UNIT IV

Composition of human body. Energy content of foods. Measurement of energy expenditure: direct & indirect calorimetry. Basal metabolic rate (BMR) and specific dynamic action (SDA) and factors affecting BMR. Thermogenic effects of foods. Energy requirements of man and woman and factors affecting energy requirements.


UNIT V

Functional Foods and Nutraceuticals - Introduction - Defining the concept – Cereals and pulses and functional food. Teleology of Nutraceuticals – Primary and secondary metabolites in plants. General Teleology – a) Carotenoids b) Conjugated linolenic acid c) Flavonoids d) Sulphur containing Amino Acid Derivatives e) Omega 3 fatty acids f) PUFA g) Terpenoids.

Dietary Supplements – role of nutraceuticals in the management of Inborn errors of metabolism, obesity, neurological disorder, diabetes mellitus, hypertension, Cardiac vascular disease, vitamin A Deficiency.

REFERNCE BOOKS

1. Practical Clinical Biochemistry, Harold Varley, 2006. 4th and 6th editions, CBS publishers
2. Clinical Chemistry in diagnosis and treatment, Mayne,1999, ELBS,
7. Clinical Chemistry in diagnosis and treatment, Mayne, 1999, ELBS


**Course Outcomes:**

1. Understand the collection and analysis of blood and urine samples.

2. Understand the role of carbohydrates and lipid metabolism in various diagnostic and therapeutic approaches.

3. Have a clear knowledge about inborn error and hereditary defects in amino acids metabolism.

4. Know about the gastric function test for diagnosis and therapeutic complications.

5. To learn the differentiate blood tests that are used to evaluate renal function test and liver functions.

6. Know in detail about the disorders of mineral metabolism and Erythrocyte metabolisms.

7. To know about the energy content of food and Nutritional profile of principal foods

8. Lean about Dietary requirements and Measurement of energy expenditure.

9. To learn about the Dietary protein and Protein energy malnutrition disorders.

10. To learn about Disorders related to the deficiency of minerals.
M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER III

<table>
<thead>
<tr>
<th>Course Name: Biostatistics and Medical Bioinformatics</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: 21PMBE03</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Marks : Internal – 25 External – 75</td>
<td>Paper Type: Elective III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OBJECTIVES:

- To study different levels of Bioinformatics tools and applications. To gain knowledge about nanoparticles and their applications in science.

- To study this paper we can understood methods which is used to implement in Research.

UNIT I

Organizing a statistical survey, Planning and executing the survey. Source of data - Primary and secondary data collection. Classification and tabulation of data. Diagrammatic and graphic presentation of data.

UNIT II

Measure of central tendency - arithmetic mean, median, mode, quartiles, deciles and percentiles. Measure of variation - range, quartile deviation, mean deviation, standard deviation, Coefficient of variation. Correlation analysis - Scatter diagram, Karl's Pearson's coefficient of correlation and Spearman's rank method. Regression analysis.

UNIT III

Sampling distribution and test of significance – Concepts of sampling, Testing of hypothesis, errors in hypothesis testing, standard error and sampling distribution, sampling of variables (large samples and small samples.). Student's "t" distribution and its applications. Chi-square test and goodness of fit. Analysis of variance - one way and two way classification. Duncan's Multiple Range test.

UNIT IV

Aims and tasks of Bioinformatics - applications of Bioinformatics - challenges and opportunities - internet basics – HTML - introduction to NCBI data model - Various file formats for biological sequences. Primary sequence databases - Composite sequence databases - Secondary databases - Nucleic acid sequence databases - Protein sequence data bases - Structural databases -- Protein structure visualization tools (Ras Mol, Swiss PDB Viewer).

Sequence analysis of Biological data - Significance of Sequence alignment - Pairwise sequence alignment methods - Multiple sequence alignment methods – Tools and application
of multiple sequence alignment.

UNIT V

Definition of genome and genomics. Types of gene map - genetic, cytogenetic and physical. Molecular markers for mapping - RFLPs, microsatellites and SNPs. Assembling a physical map of the genome - chromosome walking and jumping. Genome projects: E.coli, D.melanogaster, A. thaliana and mouse. The human genome project: goals, mapping strategies, markers, sequencing technologies, results of final sequence, potential benefits and risks, ethical, legal and social issues (ELSI).

REFERENCE BOOKS

5. Biochemical calculation and biostatistics, Dr. E.Padmini, 2010.2nd Edn. Wiley India Pvt.Limited

Course Outcomes:

1. On completion of this course, students are able to understand about biostatistics, bioethics, IPR and legal protection, patent filling and infringement and biosafety.
2. Understand the sample, population and statistical inference.
3. Gain knowledge about concept, philosophical consideration and epistemology of science, ethical terms, principles and theories of bioethics
4. Understand the basic concepts of bio-informatics databases and tools on internet. Learn how to apply computational facility in different fields of life sciences, physical and chemical sciences.

5. Have a clear detail about different protein structure and its predicting method.

6. To learn how can utilise the BLAST and FASTA analysis for biological sequence.

7. Recognise how can visual the structures and classification of proteins by visualization tools and learn to utilise this tools for alignment and analysis.

8. Understand the drug designing through computer based modification programs using synthetic or natural source.
M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER III

Course Name: Lab course V
Course code: 21PMBP05

<table>
<thead>
<tr>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Marks: Internal – 25  External – 75

Paper Type: Practical V

COURSE OBJECTIVES:

To study the basic concepts of techniques in isolation, identification and estimation of clinical samples.

I  Haematology

1. Enumeration of RBC and WBC
2. Differential count
3. Estimation of Haemoglobin
   a) Colorimetric method
   b) Sahli's method
4. Determination of Bleeding Time and Clotting time
5. ESR, Haematocrit and PCV

II  Blood/ Serum Analysis

1. Estimation of total blood sugar, GTT, GlyHb
2. Estimation of Total protein by Lowry's method
3. Determination of A:G ratio by Biuret method
4. Estimation of Urea DAM method
5. Estimation of Creatine and Creatinine- Alkaline picrate method
6. Estimation of Cholesterol, TG, HDL,LDL and VLDL
7. Estimation of Bilirubin [TB, DB & IB]
8. Estimation of Vitamin A and C
9. Determination of LDH and CPK activity
10. Determination of AST & ALT activity

11. Estimation of Cu and Fe

III Urine Analysis

1. Estimation of Urea, Uric acid, Creatine and Creatinine
2. Estimation of Titrable acidity
3. Estimation of Phosphate
4. Estimation of Na & K, Ca
5. Estimation of Chloride- Vanslyke's method

REFERENCE BOOKS


6. Harold Varley - Practical Clinical Biochemistry, Vol II Harold Varely, Alan H. G Owenlock, Maurice Bell,1980,5th Willinson Heinmann Medical


M.Sc. MEDICAL BIOCHEMISTRY

SEMESTER III

<table>
<thead>
<tr>
<th>Course Name: Lab course VI</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: 21PMBP06</td>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Total Marks: Internal – 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paper Type: Practical VI</td>
</tr>
<tr>
<td>External – 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURSE OBJECTIVES:

To study the basic concepts of techniques in alutination, precipitation and immune responses

I. Agglutination

1. Blood Grouping and Rh Typing
2. RA test
3. CRP test
4. Pregnancy Test

II. Precipitation

1. Immunodiffusion – Mancini and Ouchterlony method
2. Immuno Electrophoresis
3. Rocket Immuno Electrophoresis
4. Counter Current Immuno Electrophoresis
5. Immunoprecipitation test

III. Enzyme immune assay

1. ELISA

IV. Hybridization Technique

1. Western Blotting
REFERENCE BOOKS

1. Practical immunology Frank L Hay and Olywn M R 4Edn. Westwood
3. Laboratory techniques in Biochemistry and Molecular Biology, Work and Work.
COURSE OBJECTIVES:

This course focuses on biochemical techniques including spectrophotometry, centrifugation, electrophoresis, radioactivity, etc. Learning these techniques will be very useful for operating instruments and become the basic knowledge in their future.

UNIT - I

Classification of biomedical equipment - Diagnostic, therapeutic, and clinical laboratory equipment, bi-electric signals and their recording. Electrodes for ECG, EMG and EEG and their characteristics, bio-electrode - types, electrode - tissue interface, contact impedance.

Transducers for biomedical application. Types, properties, characteristics, and selection of transducers for biological instrumentation.

UNIT - II


UNIT - III

Principle and applications - X-ray machine, radiography, fluoroscopy, conventional X-ray imaging, angiography, Computer tomography and linear tomography. Ultrasonic imaging system. Physics of ultrasonic waves, medical ultrasound, different modes of operation of ultrasound - A scan and B scan, application of ultrasound scan, CT scan, MRI scan and echocardiography.

UNIT - IV

Introduction, characteristics, diagnostics, and therapeutic application and advantage of pulsed ruby laser, ND- YAG laser, CO₂ laser, argon laser, and helium neon laser.

Introduction, types, merits, demerits, limitations, diagnostic and therapeutic application of endoscope, laparoscope, and cardio scope.

UNIT - V

Therapeutic instruments - Introduction, types, life time, classification, power source, and
electrodes of cardiac pacemaker and defibrillators. Application of surgical diathermy
equipment and heme dialysis in medicine.

Computer application in medicine - computerized catheterization laboratory, computerized
patient monitoring system.

REFERENCE BOOKS:

Publishing Company.

2. Biomedical instrumentation, Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 1980. 2nd
Edn. Prentice-Hall,


3rd Edn. John Wiley India Pvt.Ltd.


Course Outcomes:

1. construction and applications of electrochemical techniques related to various aspects of
biological sciences.

2. Describe the techniques and applications of chromatography for biological sample
separation.

3. Recognize how the centrifugation plays a role in separation of sample with different
molecular weight.

4. Have a clear picture of radioisotopes, radioactivity, decay patterns, tracer techniques and
use of isotopes in biological studies.

5. Study the principles, mechanism and applications of various Electrophoretic techniques in
research and industrial level

6. Understand the law of absorption spectrum, principle and mechanism of UV visible
spectrophotometry, ESR, NMR, IR, spectrofluorimetry, turbidimetry, nephelometry and
luminometry, thereby learn its applications in research level.
Course Name: Molecular Biology and Biotechnology

Course code: 21PMBE04  

<table>
<thead>
<tr>
<th>Course Name: Molecular Biology and Biotechnology</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Marks: Internal – 25 External – 75</td>
<td>Paper Type: Elective IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Course Objectives:

- To describe the general principles of gene organization and expression in both Prokaryotes and eukaryotic organism.
- To explain various level of gene regulation and its functions.

UNIT I


Replication of DNA; Enzymes, replication in eukaryotes; circular and helical DNA regulation – regulation of replication. DNA damage and repair.

UNIT - II


UNIT - III


UNIT - IV

Animal cell culture: Culture media – role of carbon dioxide, serum, growth factors, glutamine in cell culture. Types of cell culture – primary and established culture, organ culture, tissue culture. Disaggregation of tissue and primary cell culture, cell separation, cryopreservation..

UNIT - V

Transgenic animals and plants – monoclonal and polyclonal antibodies – vaccines and diagnosis – edible vaccines – humulins- interferons
Stem cells – History – types- culturing of stem cells – Embryonic stem cells, cord blood, adult stem cells- cloning- stem cell banking – Stem cell therapy- Ethics.

**REFERENCE BOOKS**

4. Molecular Cell Biology – Lodish, Baltimore et al., 1995, Scientific American Book,

**Course outcome:**

1. To understand the basic structures, properties and organisation of eukaryotic and prokaryotic chromosomes.
2. To emphasize the molecular mechanism of DNA replication and recombination involved in eukaryotes and prokaryotes.
3. Deeply understand the transcription process in prokaryotes and eukaryotes.
4. To knows about the translation and post translational modification in prokaryotes and eukaryotes.
5. Learn the changes and consequences in chromosome structure and its related disorders, thereby know how the DNA repair mechanism by anticancer therapeutics involved against DNA mutation and uncontrolled cell growth.
6. Know the transgenic plants and its applications & risks. Also understand the genetic modification in food industry and its applications, controversies over risks.

7. Know the plant molecular biology techniques and its applications.
UNIT I


UNIT - II


UNIT - III

Fatty acids - source of fats and importance of fats and lipids in living organism and. Role of LDL, VLDL, HDL and chylomicrons in human body. Normal levels of cholesterol hypercholesterolemia and role of cholesterol in Blood pressure. Atherosclerosis and Heart attack' Prevention and control of heart related diseases

UNIT – IV

Water structure, physical and chemical properties. Vitamins- water soluble and fat soluble vitamins; Sources, chemical composition, Biological function and property, Deficiency diseases in human.

UNIT - V

Minerals Source and deficiency disorders of Macro-minerals; Sodium, Potassium, Calcium, Magnesium, Micro-minerals: Copper, phosphorus, Iron, Iodine, Zinc and Selenium in human Prevention and control of Anemia.

REFERENCE BOOKS


6. Fundamentals of Biochemistry for Medical Students by Ambika shanmugam 2006.Published by author;West CIT Nagar,Chennai-35


M.Sc. MEDICAL BIOCHEMISTRY

EXTRA DISCIPLINARY COURSE II

Course Name: Human Physiology and Nutrition
Course code: 21PMBED1

<table>
<thead>
<tr>
<th>Course Name: Human Physiology and Nutrition</th>
<th>Hours</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Marks : Internal – 25  External – 75

Paper Type: EDC II

UNIT I


Excretory system ; Structure of kidney and ultra-structure of nephron. Formation and composition of urine. Outline of excretory system - 'Micturition'.

UNIT - II


Circulatory organs, composition of blood, systemic, pulmonary circulation, Heartbeat, cardiac cycle, origin and conduction of heart beat, Regulation of heart beat, human heart' coronary circulation, ischemic heart disease, ECG, Blood pressure and cardiac output.

UNIT - III


UNIT – IV


UNIT - V

Nutritional consequences and Dietary Allowances Nutritive value of protein' Protein calorie

REFERENCE BOOKS


10. Human nutrition and dietetics I.S. Garral ,W.P.T.James ILPs Co3
M.Sc. MEDICAL BIOCHEMISTRY
EXTRA DISCIPLINARY COURSE III

Course Name: Hospital Management and Medical Coding

<table>
<thead>
<tr>
<th>Course code: 21PMBED3</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Marks: Internal – 25 External – 75

Paper Type: EDC III

UNIT - I

Introduction on Hospital management: Eligibility and personal skills required for Hospital management. Job opportunities in Hospital management. Important hospital management Institutes in India and World Hospital management. Concept of Modern Hospital & privatization in Health Sector, Public Sector Hospitals and Level of care offered, facilities, Effects of Globalization in Health care, Concept of Corporate Hospital in developing countries.

UNIT - II

Infrastructure and lay out of an ideal corporate hospital, Functioning of modern hospitals & changing need of patients Hospitality in Hospital Care, Invasive and non-invasive diagnostic facilities in modern hospital Care offered in Specialty and Super specialty Hospitals. Hospital management system: Benefits of Hospital management systems, Modules of Hospital management system. Interfacing of analyzer Pathology lab management. Radiology, Blood Bank, Pharmacology management software's.

UNIT - III


UNIT - IV

Impact of Medical Transcription: Medical Transcription impact on its stock holders

Impact during the implementation process. Impact on Departments, Organization as whole, Employment, Nature of job, Information access and Individual employees. Advantages in corporate entity, Disadvantages.

UNIT - V

Medical Transcription implementation: Medical Re engineering, Choosing appropriate transcription, Customise to suit the changes Medical Transcription: Best practices Costs,
Failure, Gap analysis. Implementation, Life cycle Medical Transcription- Trouble and their solutions.

**REFERENCE BOOKS**

1. Hospital Management module II- 2001, NIHFW, New Delhi