**DEPARTMENT PROFILE**

Truly keeping in mind, the needs of the times, Sourashtra College Council introduced Biochemistry at Undergraduate level in the Year 1993. The B.Sc. Biochemistry Programme was started in the Year 1993 with Chemistry and Biology as Ancillary subjects and has produced a number of undergraduates who are well placed in various fields. So far, 26 batches of students have successfully finished their graduation. The department has a well-equipped library with books and journals of well-known authors and renowned publishing houses. The goal is to provide ample resources on the campus so that they can be supplemented with additional information other than their course work. The library is stocked with more than 1,500 books. The Department is committed to give extensive hands-on-experience with modern Instrumentation and Computation which will provide problem solving skills. The department also focuses on conducting guest lectures, conferences, seminars and workshops by eminent personalities from various fields to brainstorm on various issues and help to expand the student's perspective and knowledge of the working world. The department conducts Workshops to give hands-on training to the Student community from various Colleges. The Department has conducted annual intercollegiate meet every year to promote awareness and bringing out the hidden talent among the students.

**VISION**

To mould the students with good academic record in addition to ample technical skills through a three-pronged strategy: effective teaching, quality research, relevant community service and to develop them into well-rounded responsible and highly competent individuals in the global milieu.

**MISSION**

To serve the State and the Nation by educating students, advancing their scientific knowledge, and thereby catalyzing economic development.

Signature of the Chairman/HOD

**Passed in the BOS Meeting held on 18-03-2020**

**DISTRIBUTION OF CREDITS (UG PROGRAMME)**

| PART | SEM | COURSES | NO.OF COURSES | HOURS | CREDITS | TOTAL CREDITS |
|---|---|---|---|---|---|---|
| I | I-IV | LANGUAGE | 4 | 6 | 3 | 12 |
| II | I-IV | ENGLISH | 4 | 6 | 3 | 12 |
| III | I-VI | CORE | 15(11T+4P)<br>11T = 4T(I-IV) + 7T(V&VI) | 4 | 5T(I-IV) + 4T(V&VI)<br>2CP+4CP | 60 |
| III | I-IV | ALLIED | 6(4T+2P) | 4 | 4+2 | 20 |
| III | V,VI | ELECTIVE | 3 | 5 | 5 | 15 |
| IV | I-IV | SKILL BASED SUBJECT(SBS) | 6 | 2 | 2 | 12 |
| IV | I | VALUE EDUCATION | 1 | 2 | 2 | 2 |
| IV | II | ENVIRONMENTAL STUDIES | 1 | 2 | 2 | 2 |
| IV | III,IV | NON-MAJOR ELECTIVE(NME) | 2 | 2 | 2 | 4 |
| V | IV | EXT.ACTIVITY | 1 | 0 | 1 | 1 |
| **TOTAL CREDITS** | | | | | | **140** |

## Undergraduate (UG) Programme Outcomes (POs)

Undergraduate (B. Sc) is a 3-year degree Programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

| | |
|---|---|
| **PO 1** | **Critical Thinking**: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions. |
| **PO 2** | **Problem Solving**: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution. |
| **PO 3** | **Effective Communication**: Knowledge dissemination by oral and verbal mechanisms to the various components of our society. |
| **PO 4** | **Societal/ Citizenship/ Ethical Credibility**: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions. |
| **PO 5** | **Environmental Concern and Sustainable Growth**: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment. |
| **PO 6** | **Skill Development and Employable Abilities**: Adequate training in relevant skill sector and creating employable abilities among the under graduates. |

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## PROGRAMME OBJECTIVES (B.Sc. BIOCHEMISTRY)

- The Main objective of the curriculum is to equip the students with a detailed understanding the molecular events that control growth and development of all living things and thereby enhancing the technical skills to compete and excel in the challenging career aspects.
- To demonstrate a coherent and systematic approach to the experimental and theoretical aspects of biochemistry. This would also include the student's ability to understand and engage with critical concepts, theories and dogmas.
- To demonstrate the ability to understand the role of scientific developments, particularly, biological sciences in a changing world from the disciplinary perspective as well as in relation to its professional and everyday use.
- To communicate ideas, opinions and values—both scientific themes and values of life in all shades and shapes—in order to expand the knowledge of the subject as it moves from the classroom/laboratory to industry and society.
- To demonstrate the ability to share the results of academic and disciplinary learning through different forms of communication such as essays, dissertations, reports, findings, notes, seminars etc, on different platforms of communication such as the classroom, the media and the internet.
- To recognize the scope of biochemistry in terms of career opportunities, employment and lifelong engagement in teaching, publishing, communication, media, soft skills and other allied fields.

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of B.Sc. Biochemistry Programme, the students are expected to

| | |
|---|---|
| PSO 1 | realize the essential concepts in modern biology to meet the promising trends and inculcating the aptitude to evaluate the various biological mechanisms through diagnostic tools in living cells. |
| PSO 2 | develop practical laboratory skills and strong exploratory foundation in the cross over discipline of Chemistry, Microbiology, Molecular Biology and Bioinformatics by handling microbial, cellular, molecular and biochemical systems. |
| PSO 3 | comprehend the applications of Biochemistry in various fields such as Clinical Biochemistry, Medical Diagnostics, Genetic Engineering, Molecular biology & Biotechnology. |
| PSO 4 | build and instigate innovations effectively and communicate efficiently with the scientific community and society at large to link the gap between scientific industry and academia. |
| PSO 5 | contribute to the betterment of the society by inculcating expertise in healthcare sector by developing the work efficacy as a part of a team and engage effectively in research and development. |
| PSO 6 | develop the ability and willingness to embark on new ventures and initiatives with critical thinking and desire for more continuous learning focusing on technical skills. |

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## B.Sc. BIOCHEMISTRY - COURSE STRUCTURE

### I SEMESTER

| S. No. | Sub. Code | Subject Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | 21UACT11 /H11/S11 | Tamil/Hindi/ Sanskrit | 6 | 3 | 25 | 75 | 100 | 3 |
| 2 | 21UACE11 | English | 6 | 3 | 25 | 75 | 100 | 3 |
| 3 | 21UBCC11 | Core – I Biomolecules | 5 | 3 | 25 | 75 | 100 | 4 |
| 4 | 21UBCCP1 | Core Lab - I | 2 | - | - | - | - | 0 |
| 5 | 21UBCS11 | Skill Based Subject – I Nutritional Biochemistry | 2 | 3 | 25 | 75 | 100 | 2 |
| 6 | 21UBCA11 | Allied Chemistry for Life Sciences - I | 4 | 3 | 25 | 75 | 100 | 4 |
| 7 | 21UBCAP1 | Allied Chemistry Lab – Titrimetric Analysis | 2 | - | - | - | - | 0 |
| 8 | 21UACVE1 | Value Education | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **TOTAL** | 30 | | | | | 18 |

**Practical examination conducted at the end of the even semester**

### II SEMESTER

| S. No. | Sub. Code | Subject Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | 21UACT21 /H21/S21 | Tamil/Hindi/ Sanskrit | 6 | 3 | 25 | 75 | 100 | 3 |
| 2 | 21UACE21 | English | 6 | 3 | 25 | 75 | 100 | 3 |
| 3 | 21UBCC21 | Core – II Biochemical Techniques | 5 | 3 | 25 | 75 | 100 | 4 |
| 4 | 21UBCCP1 | Core LAB - I | 2 | 3 | 40 | 60 | 100 | 2 |
| 5 | 21UBCS21 | Skill Based Subject – II Pharmacology | 2 | 3 | 25 | 75 | 100 | 2 |
| 6 | 21UBCA21 | Allied Chemistry for Life Sciences - II | 4 | 3 | 25 | 75 | 100 | 4 |
| 7 | 21UBCAP1 | Allied Chemistry Lab – Titrimetric Analysis | 2 | 3 | 40 | 60 | 100 | 2 |
| 8 | 21UACES2 | Environmental Studies | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **TOTAL** | 30 | | | | | 22 |

## III SEMESTER

| S. No. | Sub. Code | Subject Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | | Tamil/Hindi/ Sanskrit | 6 | 3 | 25 | 75 | 100 | 3 |
| 2 | | English | 6 | 3 | 25 | 75 | 100 | 3 |
| 3 | | Core - III Enzymology and Enzyme technology | 5 | 3 | 25 | 75 | 100 | 5 |
| 4 | | Core LAB – II – Lab in Biochemical Analysis | 2 | - | - | - | - | 0 |
| 5 | | Skill Based Subject – III Medical Lab Technology | 2 | 3 | 25 | 75 | 100 | 2 |
| 6 | | Allied Biology Theory – I Cell Biology and Genetics | 4 | 3 | 25 | 75 | 100 | 4 |
| 7 | | Allied Biology Lab | 2 | - | - | - | - | 0 |
| 8 | | Non Major Elective – I Health and Human Diseases | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **TOTAL** | 29 | | | | | 19 |

**Practical examination conducted at the end of the even semester**

## IV SEMESTER

| S. No. | Sub. Code | Subject Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | | Tamil/Hindi/ Sanskrit | 6 | 3 | 25 | 75 | 100 | 3 |
| 2 | | English | 6 | 3 | 25 | 75 | 100 | 3 |
| 3 | | Core – IV Metabolism | 5 | 3 | 25 | 75 | 100 | 5 |
| 4 | | Core Lab II - Lab in Biochemical Analysis | 2 | 3 | 40 | 60 | 100 | 2 |
| 5 | | Skill Based Subject – IV Biostatistics | 2 | 3 | 25 | 75 | 100 | 2 |
| 6 | | Allied Biology Theory II Biodiversity and Conservation | 4 | 3 | 25 | 75 | 100 | 4 |
| 7 | | Allied biology lab - Cell Biology & Biodiversity and Conservation | 2 | 3 | 40 | 60 | 100 | 2 |
| 8 | | Non Major Elective – II Herbal Medicine | 2 | 3 | 25 | 75 | 100 | 2 |
| 9 | | Extension Activities | - | - | - | - | 100 | 1 |
| | | **TOTAL** | 29 | | | | | 24 |

**Passed in the BOS Meeting held on 18-03-2020**

## V SEMESTER

| S. No. | Sub. Code | Subject Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | | Core – V<br>Molecular Biology | 5 | 3 | 25 | 75 | 100 | 5 |
| 2 | | Core – VI<br>General Microbiology | 4 | 3 | 25 | 75 | 100 | 4 |
| 3 | | Core – VII<br>Immunology and Immunotechnology | 4 | 3 | 25 | 75 | 100 | 4 |
| 4 | | Elective paper – I<br>Medical Diagnostics | 5 | 3 | 25 | 75 | 100 | 5 |
| 5 | | Elective - II<br>Bioinformatics | 5 | 3 | 25 | 75 | 100 | 5 |
| 6 | | Skill Based Subject – IV<br>Biochemistry of vision | 2 | 3 | 25 | 75 | 100 | 2 |
| 7 | | Core Lab -<br>Lab in Microbiology and Immunology | 5 | 3 | 40 | 60 | 100 | 4 |
| | | **TOTAL** | 30 | | | | | 29 |

## VI SEMESTER

| S. No | Sub. Code | Subject Title | Hrs. / Week | Exams (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | | Core – VIII<br>Biotechnology & Genetic Engineering | 5 | 3 | 25 | 75 | 100 | 5 |
| 2 | | Core – IX<br>Plant Biochemistry | 5 | 3 | 25 | 75 | 100 | 4 |
| 3 | | Core – X<br>Clinical Biochemistry | 4 | 3 | 25 | 75 | 100 | 4 |
| 4 | | Core – XI<br>Food processing Technology | 4 | 3 | 25 | 75 | 100 | 4 |
| 5 | | Elective – III<br>Endocrinology & Hormonal Regulations | 5 | 3 | 40 | 60 | 100 | 5 |
| 6 | | Skill Based Subject – IV<br>Forensic Analysis | 2 | 3 | 25 | 75 | 100 | 2 |
| 7 | | Core Lab -<br>Lab in Clinical Biochemistry | 5 | 3 | 40 | 60 | 100 | 4 |
| | | **TOTAL** | 30 | | | | | 28 |

**Passed in the BOS Meeting held on 18-03-2020**

## I SEMESTER

| S. No. | Sub. Code | Subject Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | 21UACT11 /H11/S11 | Tamil/Hindi/ Sanskrit | 6 | 3 | 25 | 75 | 100 | 3 |
| 2 | 21UACE11 | English | 6 | 3 | 25 | 75 | 100 | 3 |
| 3 | 21UBCC11 | Core – I Biomolecules | 5 | 3 | 25 | 75 | 100 | 4 |
| 4 | 21UBCCP1 | Core Lab - I | 2 | - | - | - | - | 0 |
| 5 | 21UBCS11 | Skill Based Subject – I Nutritional Biochemistry | 2 | 3 | 25 | 75 | 100 | 2 |
| 6 | 21UBCA11 | Allied Chemistry for Life Sciences - I | 4 | 3 | 25 | 75 | 100 | 4 |
| 7 | 21UBCAP1 | Allied Chemistry lab – Titrimetric Analysis | 2 | - | - | - | - | 0 |
| 8 | 21UACVE1 | Value Education | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **TOTAL** | 30 | | | | | 18 |

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 21UBCC11 | BIOMOLECULES | Core | 4 | 1 | - | 4 |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | 1 | 25 | 75 | 100 |

**COURSE OBJECTIVES:**

- To understand the structure and functions of Biomolecules such as Carbohydrates, Proteins, Aminoacids, Lipids, and Vitamins.
- To know the biological importance of various carbohydrates, proteins and fats.
- To know about the physiological importance of biomolecules in the human system.
- To comprehend the occurrence, physical and chemical properties of biomolecules.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| Course Outcome | | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | comprehend the fundamental knowledge of Biomolecules and their Structure. | K1,K2 |
| CO 2 | to comprehend the occurrence, physical and chemical properties of biomolecules | K2 |
| CO 3 | to know about the physiological importance of biomolecules in the human system | K2 |
| CO 4 | to know the biological importance of various Biomolecules. | K2 |
| CO 5 | to understand the significance of Biomolecules. | K2 |

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION**

## BIOMOLECULES

**UNIT-I**

Introduction - history and development of biochemistry and organic compounds Carbohydrates - structure, classification, occurrence and functions of carbohydrates-mono saccharides, oligosaccharides and polysaccharides.

**UNIT-II**

Lipids – structure, classification, types – simple, compound and derived lipids, physical and chemical properties, biological importance of lipids.

**UNIT-III**

Amino acids and Proteins-Introduction, definition and classification- physical and chemical properties, structure of proteins- primary, secondary, tertiary and quaternary structures, biological functions of proteins.

**UNIT-IV**

Nucleic acids- DNA and RNA – Introduction, definition, types, composition-nucleosides nucleotides, physical properties and chemical properties.

**UNIT-V**

Vitamins – Introduction, definition, classification- fat soluble vitamins and water-soluble vitamins-sources and physiological functions.

**TEXT BOOK(S):**

1. Fundamentals of biochemistry by J.L. Jain
2. Biochemistry by U.Satyanarayana

**REFERENCE BOOKS:**

1. Biochemistry, Lubert Stryer et al., fifth edition, W.H. Freeman and company, NY, 2003
2. Outlines of Biochemistry, E.E.Conn and Stump, Fourth edition, Wiley Eastern Ltd, 1989
3. Biochemistry, Lehninger, A.L. Nelson, Cox
4. Biochemistry, Donald Voet & Judith Voet, Wiley International Edition, 2004.

**CHAPTERS and SECTIONS (For UNIT-I, II, III,IV and V)**

- UNIT-I: Biochemistry by U. Satyanarayana – section -I – Pg.no. 5-13
- UNIT-II: Fundamentals of biochemistry by J.L. Jain, Sanjay Jain and Nitin Jain – Chapter – VIII & IX – Pg. no. 123 - 172
- UNIT-III: Biochemistry by U. Satyanarayana – section -I – Pg.no.21-33
- UNIT-IV: Biochemistry by U. Satyanarayana – section -I – Pg.no.34-56
- UNIT-V: Fundamentals of biochemistry by J.L. Jain, Sanjay Jain and Nitin Jain – Chapter – 33 – Pg. no. 959 – 1024

**Web site Links: (E-learning resources)**

- https://www.askiitians.com/revision-notes/chemistry/biomolecules/

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | S | | | | S | |
| CO2 | | M | L | | | M |
| CO3 | S | | | | | M |
| CO4 | S | | | | M | L |
| CO5 | M | | | | | M |

**S – STRONG, M – MEDIUM, L – LOW PERCENTAGE OF REVISION: 20%**

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| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| **21UBCCP1** | **CORE LAB- I** | **Core** | **-** | **-** | **2** | **-** |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| **I** | **I & II** | **-** | **-** | **-** |

**COURSE OBJECTIVES:**

- To understand the techniques involved in the qualitative analysis of Biomolecules.
- To comprehend the biochemical preparation from natural sources.
- To recognize the instrumentation and principle behind colorimeter and pH meter.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| Course Outcome | | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | to infer the normal constituents of Carbohydrate, protein, lipid, amino acid and their significance. | K2 |
| CO 2 | to experiment with the biological Quantitative for DNA and RNA | K3 |
| CO 3 | to quantitatively analyze the constituents of starch, lactose, casein, caffeine using standard methods. | K4 |
| CO 4 | to estimate the variations in the levels of pH and using colorimeter. | K5 |
| CO 5 | to determine the role of Biomolecules estimation quantitative and qualitative analysis | K5 |

**K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION**

## CORE LAB - I

1. Qualitative analysis of bioorganic compounds

a. Analysis of Carbohydrates

b. Analysis of amino acids

c. Test for proteins

d. Test for lipids- Test for cholesterol

e. Qualitative tests for DNA and RNA

2. Biochemical preparation

a. Starch from potato

b. Lactose from milk

c. Casein from milk

d. Caffeine from coffee seeds

3. Use of pH meter for the preparation of buffer

4. Verification of Beer- Lambert's law using colorimeter. Determining the concentration of any given-colored compounds using standard graph.

## REFERENCE BOOKS:

Biochemical Methods - S. Sadasivam and A. Manickam (1996) II Edition, New Age International Pvt. Ltd.

### Mapping of CO with PSO

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | M | S | | | M | |
| CO2 | | S | | M | M | |
| CO3 | | S | L | | | M |
| CO4 | M | S | | | | |
| CO5 | | S | M | | M | |

**S – STRONG M – MEDIUM L - LOW**

**PERCENTAGE OF REVISION: -NIL-**

**Passed in the BOS Meeting held on 18-03-2020**

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| **21UBCS11** | **NUTRITIONAL BIOCHEMISTRY** | **Skilled** | **1** | **1** | **-** | **2** |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| **I** | **I** | **25** | **75** | **100** |

**COURSE OBJECTIVES:**

- To understand the impact of nutrition in human system.
- To appreciate and recognize the nutritional requirements and calorific values in daily diet plan.
- To comprehend the nutritional requirements at various stages of human life span.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| Course Outcome | | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | understand simple concepts related to Nutrition like balanced diet, RDA etc., | K1 |
| CO 2 | appreciate the correlation between food and energy requirements and utilization. | K2, K3 |
| CO 3 | understand the body requirements- carbohydrates, lipids and proteins in specific quantities and its deficiency or excess leading to disorders. | K2, K3 |
| CO 4 | realize the contribution of minerals, trace elements and vitamins to the wellbeing of humans. | K2, K3 |
| CO 5 | appreciate experiments carried out by scientists to enable understand the requirement of different molecules by the body. | K2, K3 |

**K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION**

## NUTRITIONAL BIOCHEMISTRY

**UNIT-I**

Introduction- definition of food and nutrition, calorific value of foods and its determination (Bombcalorimeter) Food groups, food habits, food fads and fallacies, changing food habits.

**UNIT-II**

Proteins: food sources, complete and incomplete proteins – Energy: Basal metabolism, measurement of BMR, factors affecting BMR, total energy requirement and energy value of foods, functions of food and its relation to nutritional and clinical aspects.

**UNIT-III**

Protein nutritional Nitrogen balance, Protein nutrition abnormalities, protein deficiency disorder, Balanced diet formulation – Assessment of nutritional status.

**UNIT-IV**

Nutrition at various stages of growth and development – Diet chart for infants, children, adolescents, pregnant women, lactating mothers and older persons, micro nutrition at various stages of growth and development.

**UNIT-V**

Nutritional challenges of the future: Future foods, alternative protein foods. Antinutritional factors: Sources and harmful effects of antivitamins (eggavidin, dicoumarol), natural toxicants (eg. *Lathyrussativa*) and adulterants (eg. butter yellow, lead chromate, malachite green)

**TEXT BOOK(S):**

1. Food processing and preservation – B. Sivasankar
2. Food Science – B. Srilakshmi

**CHAPTERS and SECTIONS (For UNIT-I, II, III,IV and V)**

- Unit- I : Nutrition and Dietetics by S.A. Joshi – Section – I – Pg.no.54-68
- Unit – II : Nutrition and Dietetics by S.A. Joshi – Section – I – Pg.no. 25-31, 68-75.
- Unit – III: Biochemistry – U.Satyanarayana & U.Chakrapani – unit -23- Pg.no. 510-518
- Nutrition and Dietetics by S.A. Joshi –Section –III - Pg. no. 369-370, 382-403
- Unit-IV : Nutrition and Dietetics by S.A. Joshi – Section –I -142-150
- Unit –V: Nutrition and Dietetics by S.A. Joshi –Section –III - Pg. no.493-497

**REFERENCE BOOKS:**

1. Principles of Nutrition Determination Dietetics – Dr. M. Swaminathan
2. Advanced Textbook on food and Nutrition – Vol-I & II, Dr.M. Swaminathan, II edition
3. Normal and Therapeutic Nutrition – Corine Robinson.

**Web site Links: (E-learning resources)**

- http://www.hindustantimes.com/india/food-fallacies/story-WWzEzOIngVeLdcQyIuPm8K.html
- http://blogs.arynews.tv/food-fads-fallacies/
- http://www.biologydiscussion.com/single-cell-protein/production-of-single-cell-protein-and-mushrooms/10392
- http://www.slideshare.net/UXTrendspotting/future-of-food-37191410

- **Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | S | | | | S | |
| CO2 | | M | L | | | M |
| CO3 | S | | | | | M |
| CO4 | S | | | | M | L |
| CO5 | M | | | | | M |

**S – STRONG, M – MEDIUM, L – LOW PERCENTAGE OF REVISION: 40%**

**Passed in the BOS Meeting held on 18-03-2020**

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 21UBCA11 | ALLIED CHEMISTRY FOR LIFE SCIENCES - I | Allied | 3 | 1 | - | 4 |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

**COURSE OBJECTIVES:**

- To provide a deep insight about the atomic structure.
- To be acquainted with the types and characteristics of chemical bonds and intermolecular forces.
- To apprehend the concepts of acids & bases and biological applications of buffer solutions.
- To understand the principles of surface chemistry and various ways of articulating the concentration of solutions**.**
- To understand the applications of surface chemistry and the types and role of catalysts.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| Course Outcome | | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | figure out the inclusive account of atomic structure and the applications of radioisotopes. | K1,K2,K3 |
| CO 2 | identify with the kinds and characteristics of chemical bonds, molecular interactions and dipole interactions. | K1,K2 |
| CO 3 | discern the concepts of acids& bases and to be acquainted with the biological importance of buffer solutions. | K1,K2, K3 |
| CO 4 | categorize the means of expressing the concentration of solutions and to appreciate the applications of osmosis & isotonic solutions. | K1, K2 |
| CO 5 | appreciate the principles and applications of surface chemistry. | K2, K3 |

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION**

**Passed in the BOS Meeting held on 18-03-2020**

## ALLIED CHEMISTRY FOR LIFE SCIENCES - I

**UNIT I : ATOMIC STRUCTURE** : :[12 Hrs]

Constituents of atom – atomic number – mass number – isotopes – isobars – shapes of orbitals – quantum numbers – Aufbau principle – Hund's rule – Pauli's exclusion principle - electronic configuration of atoms – salient features of modern periodic table . Radio isotopes: Tracer technique – application in the field of medicine, industry, agriculture and biology .

**UNIT II: CHEMICAL BONDING**: : [12 Hrs]

Ionic, covalent, polar covalent and co-ordinate bonds ( definition , characteristics and examples) – Intermolecular forces : vanderwaal's forces – dipole-dipole , dipole- induced dipole, induced dipole- induced dipole interactions – Hydrogen bonding : definition, conditions for formation, types and characteristics of hydrogen bonded compounds .

**UNIT III : CONCEPT OF ACIDS AND BASES** : : [12Hrs]

Arrhenius concept , Bronsted-Lowry concept , conjugate acid- base pairs, Lewis concept – relative strength of acid and bases – ionic product of water – pH and pOH - pH meter – buffer solutions and its types – Henderson equation – biological applications of buffer solutions – acid-base titrations – indicators – theory of indicators .

**UNIT IV: SOLUTIONS**::[12 Hrs]

Definition – types of solutions – concentration – solute – solvent – molecular weight – equivalent weight – various ways of expressing concentration of solutions : molarity, molality, normality, ppm, w/w,w/v, v/v (problems involving direct substitution only) – osmosis and its applications – isotonic solutions and its biological importance – hypertonic and hypotonic solutions – reverse osmosis and its application .

**UNIT V : SURFACE CHEMISTRY** : :[12 Hrs]

1) Adsorption : Definition – mechanism of adsorption – types of adsorption – physical and chemical adsorption – factors influencing adsorption - application of adsorption – ion-exchange adsorption and its application .

2) Catalysis : Definition – general characteristics of catalytic reactions – types of catalysts ( positive, negative, auto and induced ) – types of catalysis ( homogeneous and heterogeneous) – acid- base catalysis – theories of catalysis (adsorption and intermediate compound formation theory ) – catalytic poisons – catalytic promoters – enzyme catalysis – characteristics .

**TEXT BOOK(S):**

1) Essentials of physical chemistry by ArunBahl, B.S. Bahl and G.D. Tuli., S. Chand &co
2) Principles of physical chemistry by Puri , Sharma and pathania

**REFERENCE BOOKS:**

1) Principles of Inorganic Chemistry by Puri, Sharma &Kalia, Milestone.publisher& distributor (2009).
2) Modern Inorganic Chemistry by R.D. Madan S. Chand and Co. Ltd. (2012).

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | -- | L | - | -- |
| CO2 | S | -- | M | - | -- |
| CO3 | S | M | - | L | L |
| CO4 | S | M | S | L | M |
| CO5 | S | - | M | L | M |

**S – STRONG M – MEDIUM L – LOW**

**PERCENTAGE OF REVISION: 30%**

**Passed in the BOS Meeting held on 18-03-2020**

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| **21UBCAP1** | **TITRIMETRIC ANALYSIS** | **Allied** | **-** | **-** | **2** | **2** |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| **I** | **I & II** | **-** | **-** | **-** |

**COURSE DESCRIPTION:**

To practice the quantitative estimation of substances by titration methods.

**COURSE OBJECTIVES:**

A double titration involving the making up of the solution to be estimated and the preparation of a primary standard solution.

**COURSE OUTCOMES (COs):**

| CO | Course Outcome | Knowledge level (on the basis of Blooms Taxonomy) |
|---|---|---|
| **CO** | Illustrate the estimation of substance by various types of titration method | K2,K3,K4, K5 |

**K1- KNOWLEDGE (REMEMBERING) , K2 - UNDERSTANDING , K3 -APPLYING , K4- ANALYZING, K5-EVALUATING, K6 – CREATING**

**Passed in the BOS Meeting held on 18-03-2020**

## TITRIMETRIC ANALYSIS

**LIST OF EXPERIEMENTS:**

**I. ACIDMETRY AND ALKALIMETRY**

1. Titration between a strong acid and strong base
2. Titration between a strong acid and weak base
3. Titration between a weak acid and strong base

**II. PERMANGANIMETRY**

4. Titration between potassium permanganate and oxalic acid
5. Titration between potassium permanganate and ferrous sulphate
6. Titration between potassium permanganate and Mohr's salt

**III. EDTA TITRATIONS (DEMONSTRATION ONLY)**

7. Estimation of $Ca^{2+}$ ions in water using EDTA
8. Estimation of $Mg^{2+}$ ions in water using EDTA

**Distribution of Marks:** **Internal - 40 Marks External - 60 Marks**

| **External examination:** | | **Internal examination:** | |
|---|---|---|---|
| Record notebook | 10 marks | Test | 25marks |
| Procedure writing | 10 marks | Assignment | 5 marks |
| Experiment | 40 marks | Observation notebook | 10 marks |
| **Total** | **60 marks** | **Total** | **40 marks** |

For analysis, if the student has

< 2% error - 40 marks
2 – 3% error - 30 marks
3-5% error - 20 marks
>5% error - 10 marks

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**Passed in the BOS Meeting held on 18-03-2020**

## II SEMESTER

| S. No. | Sub. Code | Subject Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | 21UACT21 /H21/S21 | Tamil/Hindi/ Sanskrit | 6 | 3 | 25 | 75 | 100 | 3 |
| 2 | 21UACE21 | English | 6 | 3 | 25 | 75 | 100 | 3 |
| 3 | 21UBCC21 | Core paper – II Biochemical Techniques | 5 | 3 | 25 | 75 | 100 | 4 |
| 4 | 21UBCCP1 | Core LAB - I | 2 | 3 | 40 | 60 | 100 | 2 |
| 5 | 21UBCS21 | Skill Based Subject – II Pharmacology | 2 | 3 | 25 | 75 | 100 | 2 |
| 6 | 21UBCA21 | Allied Chemistry for Life sciences - II | 4 | 3 | 25 | 75 | 100 | 4 |
| 7 | 21UBCAP1 | Allied Chemistry lab – Titrimetric analysis | 2 | 3 | 40 | 60 | 100 | 2 |
| 8 | 21UACES2 | Environmental Studies | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **TOTAL** | 30 | | | | | 22 |

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| **21UBCC21** | **BIOCHEMICAL TECHNIQUES** | **Core** | **4** | **1** | **-** | **4** |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| **I** | **II** | **25** | **75** | **100** |

**COURSE OBJECTIVES:**

- To understand the impact of the scientific instrumentation in the area of research.
- To appreciate and recognize the working principle and applications of Biochemical instrumentation.
- Develop competence in handling various chromatographic techniques and apply them in isolating and characterizing different biological molecules.
- Understanding the applications of Centrifugation and Electrophoresis in biological investigations/Experiments.
- To comprehend the importance and applications of radioactive isotopes.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| Course Outcome | | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | to understand the impact of the scientific instrumentation in the area of research. | K1,K2 |
| CO 2 | understanding the applications of centrifugation and colorimetry in biological investigation | K2 |
| CO 3 | develop competence in handling various chromatographic techniques and apply them in isolating and characterizing different biological molecules. | K2 |
| CO 4 | understanding the principles of Electrophoresis and its applications | K2 |
| CO 5 | to comprehend the importance and applications of radioactive isotope | K2 |

**K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION**

## BIOCHEMICAL TECHNIQUES

**UNIT-I:** Spectroscopic techniques- Introduction - beer Lambert law, light absorption and transmission. Principle, applications and instrumentation of colorimeter, UV spectrophotometer atomic absorption spectrophotometer.

**UNIT-II:** Basic principles of centrifugation- relative centrifugal force, factors affecting centrifugation, Centrifuge - types and instrumentation.

**UNIT-III:** Chromatography-Introduction, definition, types - Column, Paper and Thin layer chromatography, adsorption partition, affinity, Ion exchange, Gas chromatography, HPLC, Gel filtration and application of chromatography techniques.

**UNIT-IV:** Electrophoresis- Introduction, definition, principle, factors affecting electrophoresis, types - Agarose, SDS PAGE, paper electrophoresis,2D gel electrophoresis, isoelectric focusing- applications of electrophoresis

**UNIT-V:** Radioisotopes in Biochemistry: Radioactivity, radioactive decay, units of radioactivity, measurement of radioactivity – principle, instrumentation and application - Geiger-Muller counter, scintillation counter, autoradiography-Applications of radioisotopes in biology.

**TEXT BOOK(S):**

1. Practical Biochemistry - Wilson and Walker
2. Biochemical Techniques - Upadhyay & Upadhyay

**REFERENCE BOOKS:**

1. Tools in Biochemistry, Terrance G.Cooper.
2. Separation methods in Biochemistry. CJOR Morris and Maris.
3. Spectroscopy in Biology and chemistry. Sow Hsinchen and Siney YI
4. The use of radioactive isotopes in the life sciences. Chapman and Acerey
5. Manometric and Biochemical techniques. Umbrit and Burris
6. Analytical Biochemistry by Dr. P. Palanivelu.
7. Modern Experimental Biochemistry 3rd edition, Rodney Boyer, Pearson education,2004.

**CHAPTERS and SECTIONS (For UNIT-I, II, III,IV and V)**

- **Unit I :** Analytical Biochemistry by Dr. P. Palanivelu – Part –II – Pg.no. 14-22
- **Unit II :** Analytical Biochemistry by Dr. P. Palanivelu – Part –III – Pg. no. 107-113, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 10 -301 - 343
- **Unit III :** Analytical Biochemistry by Dr. P. Palanivelu – Part –III – Pg. no. 142- 167, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 11 -344 - 421
- **Unit IV :** Analytical Biochemistry by Dr. P. Palanivelu – Part –III – Pg. no. 114 – 135, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 12 -422-478
- **Unit V:** Fundamentals of biochemistry by J.L. Jain – Part- VI – Pg.no. 853-856, Biochemical Techniques - Upadhyay & Upadhyay – chapter – 13 -479-545

**Web site Links: (E-learning resources)**

- **https://www.biochemden.com/biochemical-techniques-basics/**
- **https://www.studocu.com/en/document/ladoke-akintola-university-of-technology/biochemical-techniques/lecture-notes/biochemical-techniques-by-augustine-i-airaodion/2854558/view**

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | S | | | | S | |
| CO2 | | M | L | | | M |
| CO3 | S | | | | | M |
| CO4 | S | | | | M | L |
| CO5 | M | | | | | M |

**S – STRONG, M – MEDIUM, L – LOW PERCENTAGE OF REVISION: 20%**

**Passed in the BOS Meeting held on 18-03-2020**

| Course Code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| **21UBCCP1** | **CORE LAB - I** | Core | - | - | 2 | 2 |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| **I** | **II** | **40** | **60** | **100** |

**COURSE OBJECTIVES:**

- To understand the techniques involved in the qualitative analysis of Biomolecules.
- To comprehend the biochemical preparation from natural sources.
- To recognize the instrumentation and principle behind colorimeter and pH meter.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| Course Outcome | | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | to infer the normal constituents of Carbohydrate, protein, lipid, amino acid and their significance. | K2 |
| CO 2 | to experiment with the biological Quantitative for DNA and RNA | K3 |
| CO 3 | to quantitatively analyse the constituents of starch, lactose, casein, caffeine using standard methods. | K4 |
| CO 4 | to estimate the variations in the levels of pH and using colorimeter. | K5 |
| CO 5 | to determine the role of Biomolecules estimation quantitative and qualitative analysis | K5 |

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING,K3-APPLICATION**

## CORE LAB - I

1. Qualitative analysis of bioorganic compounds
   a. Analysis of Carbohydrates
   b. Analysis of amino acids
   c. Test for proteins
   d. Test for lipids- Test for cholesterol
   e. Qualitative tests for DNA and RNA
2. Biochemical preparation
   a. Starch from potato
   b. Lactose from milk
   c. Casein from milk
   d. Caffeine from coffee seeds
3. Use of pH meter for the preparation of buffer
4. Verification of Beer- Lambert's law using colorimeter
   Determining the concentration of any given-colored compounds using standard graph.

**REFERENCE BOOKS:**

Biochemical Methods - S. Sadasivam and A. Manickam (1996) II Edition, New Age International Pvt. Ltd.

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | M | S | | | M | |
| CO2 | | S | | M | M | |
| CO3 | | S | L | | | M |
| CO4 | M | S | | | | |
| CO5 | | S | M | | M | |

**S – STRONG** **M – MEDIUM** **L - LOW**

**PERCENTAGE OF REVISION: -NIL-**

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| **21UBCS21** | **PHARMACOLOGY** | **Skilled** | **1** | **1** | **-** | **2** |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| **I** | **II** | **25** | **75** | **100** |

**COURSE OBJECTIVES:**

- To learn basic scientific concepts and principles that will serve as the foundation for understanding the pharmacology of specific drugs.
- To understand the Pharmacology and clinical use of the major class of clinically important drugs.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| CO | Course Outcome | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | understand the basic scientific concepts and principles that serve as the foundational underpinnings of the pharmacological sciences. | K1 |
| CO 2 | appreciate the fundamental pharmacological properties that influences route of administration, drug action; drug efficacy and potency. | K1,K2 |
| CO 3 | apply the basic pharmacological knowledge in the prevention and treatment of various diseases. | K3 |
| CO 4 | explicate the mechanism of drug action at organ system/sub cellular/ macromolecular levels. | K2,K3 |
| CO 5 | demonstrate the ability to effectively communicate and work collaboratively together with peers in the small group setting to successfully address problems of pharmacological significance. | K3 |

**K1- KNOWLEDGE(REMEMBERING), K2-UNDERSTANDING,K3-APPLICATION**

## PHARMACOLOGY

**UNIT-I**

Principle and concept of Pharmacology, Drug classes- herbal drugs and allopathy drugs.

**UNIT-II**

Drug metabolism- Drug distribution, transformation and elimination. Chemical pathways of drug metabolism - Phase I and II reactions.

**UNIT-III**

Principles and mechanism of drug action, Factors affecting drug action, routes of drug administration

**UNIT-IV**

Scientific evaluation of traditional drugs. Herbal drug formulation & acute toxic test on animals.

**UNIT-V**

Safety & efficacy of drugs, clinical studies with herbal drugs, toxicology of crude extracts, herbal drug toxicity.

**TEXT BOOK(S):**

1. Pharmacological Microbiology- Hegho WB and Rusellael.
2. Essentials of Medical Pharmacology, 7th edition (2010), K.D. Tripathi, Jaypee Brothers.

**REFERENCE BOOKS:**

1. H.P. Rang, M.M. Dale, J.M. Ritter and P.K. Moore Pharmacology, 7th edn (2011),
2. Churchill Livingstone.
3. S.K. Kulkarni, Vallabh Prakashan Hand book of Experimental Pharmacology, 4th ed (2012) Basic pharmacology- Henry, Hinter and Barbaroongle.
4. Pharmacological chemistry- Satoskar Vol I and II
5. A concise text book of pharmacology. -N.Murugesh

**CHAPTERS and SECTIONS (For UNIT-I, II, III,IV and V)**

- UNIT I : A concise text book of pharmacology.-N.Murugesh Pg.no. 1-3
- UNIT II : A concise text book of pharmacology.-N.Murugesh Pg .no.12-19
- UNIT III : A concise text book of pharmacology.-N.Murugesh Pg.no.4-8
- UNIT IV : http://www.sciencedomain.org/abstract/4872
    - http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-879X2000000200004
- UNIT V : http://naturalingredient.org/wp/wp-content/uploads/42020.pdf

**Web site Links: (E-learning resources)**

- http://watcut.uwaterloo.ca/webnotes/Pharmacology/
- https://www.docsity.com/en/study-notes/medicine-and-pharma/pharmacology/

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | S | | | | M | L |
| CO2 | M | L | | | S | M |
| CO3 | L | | M | | S | |
| CO4 | S | | | M | M | |
| CO5 | | | | | | S |

**S – STRONG, M – MEDIUM, L – LOW PERCENTAGE OF REVISION: 40%**

**Passed in the BOS Meeting held on 18-03-2020**

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| **21UBCA21** | **ALLIED CHEMISTRY FOR LIFE SCIENCES II** | Allied | 3 | 1 | - | 4 |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| **I** | **II** | **25** | **75** | **100** |

**COURSE OBJECTIVES:**

- To comprehend the elementary means of organic chemistry.
- To be acquainted with the classification, properties and applications of carbohydrates, aminoacids, proteins and nucleic acids.
- To appreciate the occurrence, extraction course, classification, structure and biological importance of alkaloids and terpenoids.
- To realize the categorization, properties and magnitude of analgesics, antipyretics, anaesthetics and antibiotics.

**COURSE OUTCOMES(COs):**

| CO | Course Outcome | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | To realize the vital notions of organic chemistry. | K1,K2 |
| CO 2 | To understand the organization, chemical properties and applications of carbohydrates. | K2 ,K3 |
| CO 3 | To recognize the classification, structure and biological significance of aminoacids, proteins and nucleic acids. | K1,K2, K3 |
| CO 4 | To discern the occurrence, structural and biological significance of alkaloids and terpenoids. | K1, K2 |
| CO 5 | To appreciate the classification, structure and therapeutic uses of analgesic, antipyretic, anaesthetic and antibiotic drugs. | K1, K2, K3 |

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLICATION**

**Passed in the BOS Meeting held on 18-03-2020**

## ALLIED CHEMISTRY FOR LIFE SCIENCES - II

**UNIT-I:FUNDAMENTAL CONCEPTS OF ORGANIC CHEMISTRY :[12Hrs]** Characterisation, classification and purification of organic compounds (crystallization, sublimation, fractional distillation , steam distillation, extraction with solvents and chromatography ) – functional groups and its characteristics – organic reagents and its classification – organic reactions and its types : addition, substitution, elimination, rearrangement and polymerization (examples only) .

**UNIT – II: CARBOHYDRATES**: **[12Hrs]**

Definition – classification – monosaccharides : chemical properties of glucose and fructose - uses – disaccharides: sucrose- manufacture and properties-Polysaccharides: study of starch and cellulose (structure) – applications – colour reactions .

**UNIT- III : AMINOACIDS, PROTEINS AND NUCLEIC ACIDS:[12Hrs]**

1) AMINOACIDS : Definition **–** essential and non-essential amino acids – classification – properties: zwitterion and isoelectric point .

2) PROTEINS :Definition – various classification – structure of proteins – biological functions – colour reactions

3) Nucleic acids **:**Types – DNA and RNA – differences between them – elementary idea about their biological functions .

**UNIT - IV : ALKALOIDS AND TERPENOIDS :[12Hrs]**

1) ALKALOIDS : Definition – occurrence – extraction – functions – general properties – classification – structure and biological importance of cocaine, nicotine, morphine, piperine and atropine .
2) TERPENOIDS : Definition – occurrence – isolation – isoprene rule – classification – general properties – structure and biological importance of citral, geraniol, menthol and camphor .

**UNIT- V : DRUGS : [12Hrs]**

1) ANALGESICS AND ANTIPYRETICS : Definition – types - Narcotic analgesics : morphine, pethidine and methadone – non-norcotic analgesics : aspirin, methyl salicylate, paraacetamol – structure and uses .
2) ANAESTHETICS : Definition – characteristics – classification – general anaesthetics : chloroform, nitrous oxide, cyclopropane – local anaesthetics: cocaine, procaine , amethocaine – structure and uses .
3) ANTIBIOTICS : Definition – condition - classification – structure and therapeutic uses of penicillin, streptomycin, chloramphenicol and tetracycline.

**Passed in the BOS Meeting held on 18-03-2020**

**TEXT BOOK(S):**

1) A Text Book of Organic Chemistry by B.S.Bahl & ArunBahl., S.Chand& Co. Ltd., 1996.

2) Textbook of organic chemistry by P.L.Soni& H.M. Chawla, Sultan chand & sons

3) A Textbook of pharmaceutical chemistry by Jayashree Ghosh,S.Chand & co.Ltd

**REFERENCE BOOKS:**

1) Advanced organic chemistry by ArunBahl and B.S.Bahl
2) Organic chemistry of natural products (vol – I) by Gurdeep Chatwal., Himalaya publishing house
3) Organic chemistry of natural products (vol – II) by Gurdeep Chatwal., Himalaya publishing house

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | M | L | - | -- |
| CO2 | S | M | - | - | L |
| CO3 | S | - | - | L | - |
| CO4 | S | - | - | - | L |
| CO5 | S | - | - | L | L |

**S – STRONG** **M – MEDIUM** **L – LOW**

**PERCENTAGE OF REVISION: 15%**

**Passed in the BOS Meeting held on 18-03-2020**

| Course code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 21UBCAP1 | TITRIMETRIC ANALYSIS | Allied | - | - | 2 | 2 |

L – Lecture T – Tutorial P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I & II | 40 | 60 | 100 |

**COURSE DESCRIPTION:**
To practice the quantitative estimation of substances by titration methods.

**COURSE OBJECTIVES:**
A double titration involving the making up of the solution to be estimated and the preparation of a primary standard solution.

**COURSE OUTCOMES (COs):**
**After the completion of the course, the students will be able to**

| CO | Course Outcome | Knowledge level (on the basis of Blooms Taxonomy) |
|---|---|---|
| CO | illustrate the estimation of substance by various types of titration method | K2,K3,K4, K5 |

**K1- KNOWLEDGE (REMEMBERING) , K2 - UNDERSTANDING , K3 -APPLYING , K4- ANALYZING, K5-EVALUATING, K6 – CREATING**

**Passed in the BOS Meeting held on 18-03-2020**

## TITRIMETRIC ANALYSIS

**LIST OF EXPERIEMENTS:**

**I. ACIDMETRY AND ALKALIMETRY**

1. Titration between a strong acid and strong base
2. Titration between a strong acid and weak base
3. Titration between a weak acid and strong base

**II. PERMANGANIMETRY**

4. Titration between potassium permanganate and oxalic acid
5. Titration between potassium permanganate and ferrous sulphate
6. Titration between potassium permanganate and Mohr's salt

**III. EDTA TITRATIONS (DEMONSTRATION ONLY)**

7. Estimation of $Ca^{2+}$ ions in water using EDTA
8. Estimation of $Mg^{2+}$ ions in water using EDTA

**Distribution of Marks: Internal - 40 Marks External - 60 Marks**

| **External examination:** | | **Internal examination:** | |
|---|---|---|---|
| Record notebook | 10 marks | Test | 25marks |
| Procedure writing | 10 marks | Assignment | 5 marks |
| Experiment | 40 marks | Observation notebook | 10 marks |
| **Total** | **60 marks** | **Total** | **40 marks** |

For analysis, if the student has

< 2% error - 40 marks
2 – 3% error - 30 marks
3-5% error - 20 marks
>5% error - 10 marks

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**Passed in the BOS Meeting held on 18-03-2020**