THREE YEARS' B.Sc.

CBCS COURSE OF STUDIES

BIOCHEMISTRY (Honours)

2018

SEM-I

CC-1: Molecules of Life

Studying this chapter helps the students to understand

- Mesmerizing constituency of small chemical molecules in the very larger biologically active organic molecules.
- Chemical and structural dissection of polymeric biomolecules.
- Qualitative and quantitative testing of different biomolecules.

CC-2: General Organic Chemistry

- General organic chemistry is important because it is the study of life and all the chemical reactions related to life. Organic chemistry plays a part in the development of common household chemicals, foods, plastics, drugs and fuels.
- Studying atomic structure is important because they help us visualize the interior of atoms and molecules, and thereby predicting properties of matter.
- Using stereochemistry, chemists can work out the relationships between different molecules that are made up from the same atoms.They can also study the effect on the physical or biological properties these relationships give molecules .An important part of stereochemistry is the study of chiral molecules.
- Nucleophilic substitution reaction are an important class of reactions that allow the interconversion of functional groups.
- Electrophilic aromatic substitution is one of the most important reactions in synthetic organic chemistry. Such reactions are used for the synthesis of important intermediates that can be used as precursors for the production of pharmaceutical, agrochemical and industrial products.

SEM-II

CC-3: General Physical Chemistry

- Thermodynamics is a very important branch of both physics and chemistry. It deals with the study of energy, the conversion of energy between different forms, and the ability of energy to do work.

  The teaching of thermodynamics has made significant progress moving from the traditional theoretical method to the use of computer technology. The implementation of this type of knowledge provides many benefits to students promoting better education.

- The importance of electrochemistry – we literally cannot live without electrochemistry for proper cell function and transmission of signals through the nervous system. Students can benefit is that electrochemistry is vital in a wide range of important technological applications.

- Surface Chemistry (eg. Surface tension) and non-ideal and ideal solution: We will hopefully provide some useful insights and generate interest in developing activities to expand knowledge and improve the capabilities of individual students.

- Titration is an analytical technique that is widely used in the food industry, eg. concentration of vitamin C which affects product colour. These are very important for students of bio chemistry.

CC-4: Enzymes

- Enzymology aiming to understand how enzymes work through the relationship between structure and function and how their level in body fluid indicates the different diseases, it may be inherited or not.
- It also informs hoe enzymes are widely used in food industry for processing raw materials for production of numerous and common products such as dairy, bakery, meet, fruit, beer and also in lather and washing industry.

SEM-III

CC-5: Bio-physical Chemistry

- Spectroscopy represents a scientific measurement technique for the studying of matter through its interaction with different components of the electromagnetic spectrum. Spectroscopy is the part of our syllabus and could be an important subject for bio chemistry students. Our college does have access to the high-cost instruments for students learning. Students gets an opportunity to use and understand university-level equipment which benefits them in near future.

- The knowledge of viscosity is acquired by students through mathematical equations. They can propose physical models to explain the different viscous nature of various fluids. With knowledge shared by faculty on Viscosity, students can pursue Fluid Mechanics in their higher studies.

- The students should know the similarities and differences between Ostwald and other viscometers (Ubbelohde Viscometers) for their future higher studies.

CC-6: Metabolism of Carbohydrates and Lipids

- The brunch of biochemistry (Metabolism part) keeps alive by giving energy and building blocks elements for growth propagation.
- This also gives the idea about the mechanism of metabolic disorder diseases and also correlates with the symptoms and also inform how to relief from this.

CC-7: Cell Biology

- Students get an idea of different types of cell, structure and function of various cellular organelles not only theoretically but also practically. This helps them have a clear cut idea of the structural and functional unit of life.
- Additionally they learn about cell to cell communication, intracellular transport of cargo proteins which helps them think critically about the various activities that are taking place inside the cell. They can apply this knowledge and critical thinking in research where they can solve various mysteries related to cellular interaction which often leads to various diseases.

SEC A1: Tools and Techniques in Biochemistry

- Laboratories can be dangerous places to work and students need to be aware of the potential hazards and know what to do in cases of emergency which can help them to prevent and eliminate hazards.
- A spectrophotometer measures the amount of light transmitted through a substance and is an invaluable instrument in science. Spectrophotometers find greater application in clinical laboratories and other scientific fields such as molecular biology, chemistry and biochemistry.
- UV-VIS spectroscopy is commonly used by analytical chemists for the quantitative determination of different analytes, such as organic compounds, macromolecules and metal ions.
- It is important to learn about buffers. Buffers are extremely important to living organisms because most biochemical processes proceed normally only when the pH remains within a fairly narrow range, Therefore, buffers are commonly used in living organisms to help maintain a relatively stable pH.

SEC A2: Protein Purification Techniques

Studying this paper will help students to understand

- To understand the larceny in the isolation and purification of native and recombinant protein from different sources.
- To understand the different highly advanced techniques in the isolation and purification of proteins.

SEM-IV

CC-8: Membrane Biology and Bioenergetics

Studying this paper will help students to understand

- The marvellous construction of cell membrane.
- The versatile function of cell membrane.
- The fascinating directional in cell membrane transports of different chemicals in different places and conditions.
- The mechanisms of genesis of biological energy using inorganic chemicals and their utilizations.
- The transformation of energy within living organisms, and between living organisms and their environment.
- How are the components of bilayer membrane is separated, enumerated, characterized, or may be utilized in therapeutic drug delivery system with practical experiences.

CC-9: Metabolism of Amino Acids and Nucleotides

- The brunch of biochemistry (Metabolism part) keeps alive by giving energy and building blocks elements for growth propagation.
- This also gives the idea about the mechanism of metabolic disorder diseases and also correlates with the symptoms and also inform how to relief from this.

CC-10: Basic Microbiology and Microbial Genetics

- This paper will help students learn the basic microbiological safety practices which will be helpful in their day-to-day life as well as research purposes
- The topics covered in the regulation of microbial growth by using physical and chemical means brings awareness in the young minds regarding safety measures we can follow to prevent microbial growth which is extremely necessary in the present scenario. Moreover, it makes them aware of the antibiotic misuse that is one of the major problems related to antibiotic resistance.
- Additionally, the subjects covered in this paper prepare students to join industry as well as research field as knowledge regarding growth and metabolism of bacteria is extremely necessary.

SEC B1: Clinical Biochemistry

- The paper makes students aware of the various physiological parameters that need to be checked for any kind of disease manifestation.
- Such a vast theoretical as well as practical knowledge of one of the important application field of biochemistry helps student when they join any clinical or research laboratory.

SEC B2: Recombinant DNA Technology

Studying this paper will help students to understand

- To understand the manipulation of genetic materials especially the DNA of different organisms with some practical experiences.
- To understand the technique of the production of gene therapies, protein therapies and vaccines etc.
- How precisely the Genetic Engineering can help in different critical forensic investigations.

SEM-V

CC-11: Gene, Gene Expression and Regulation

- The topics covered in this paper provide students with an insight into the genetic material of the cell, its replication, transcription and translation and their regulation. This knowledge help students decipher the various diseases associated with the deregulation of the process.
- Moreover, they get a handson experience of isolating DNA and estimating its purity and concentration. This experience helps them capable of handling various molecular biological techniques

CC-12 Physiology and Hormones

- This paper in general provides students with detailed information about human physiological processes, hormones and their regulation. These topics bring about awareness about various physiological processes which they can apply in their day to day life.
- Moreover the knowledge they gain from this paper will help them in pursing research activities in the field of human physiology, endocrine signaling and disease associated with them, etc.

DSE A1: Nutritional Biochemistry

- The topics covered in this paper bring about a better understanding of the field of nutrition which is very much needed in the well being of a human being.
- The detailed information that the students gather about various dietary factors along with knowledge of the field of metabolism enables them to work in various fields related to nutrition and diet which has a high demand now-a-days.

DSE A2: Molecular basis of infectious human diseases

- This paper helps student know about various important infectious diseases caused by bacteria, virus, parasite and fungus and makes them aware of the disease progression and prevention.
- Students also get to learn the various diagnostic methods like ELISA, PCR based method which will be helpful in their future prospect where they can utilize this knowledge to work in some infectious disease laboratory.

DSE B1: Advanced Biochemistry

Studying this paper will help students to understand

- How is light energy gets transformed into chemical energy
- How was the oxygenic photosynthesis system evolved in this world.
- The different pathways of photorespiration in plants.
- Different types of biomolecular interactions.

- Interaction of electromagnetic radiations with the different biomolecules and utilization of this phenomenon in the accurate estimation of different biomolecules.

DSE B2: Plant Biochemistry

- Understanding plant biochemistry will help students develop physiologically healthy, disease free crops and plants which will be able to give to a better yield and will cater to the country's ever growing need for food.

SEM-VI

CC-13: Genetic Engineering and Biotechnology

Studying this paper will help students to understand

- To understand the manipulation of genetic materials especially the DNA of different organisms with some practical experiences.
- To understand the technique of the production of gene therapies, protein therapies and vaccines etc.
- How precisely the Genetic Engineering can help in different critical forensic investigations.

CC-14: Immunology

- Immunology related to immune system inform the mechanism of infection and relief from that infection which is called defence mechanism.
- It also informs numerous tests of immune system and discipline of medicine particularly in the field of organ transplantation, oncology, rheumatology, virology, autoimmune disease, hypersensitivity.

DSE A3: Advanced Cell Biology

- The paper makes students aware of the modern day technologies like ultracentrifugation, high end microscopy, immunohistochemistry; knowledge they can apply when they join any research laboratory.
- Moreover, the topics like cell to cell communication, cellular division and its control help students learn the basics of various diseases like cancer that results from uncontrolled cellular division.
- They learn the detection of cell viability assay as well detection of apoptosis practically so that they can join research laboratories with previous expertise of such techniques.

DSE A4: Molecular basis of non-infectious human diseases

Studying this paper will help students to understand

- To understand the different causes, mechanisms of different non-infectious diseases.
- To have a preliminary knowledge to be aware about the different causes of different types of cancers.
- To have some practical experiences on the characterization, estimation of different clinically important blood proteins.

DSE B3: Molecular diagnostics

- This paper mainly makes students aware of various modern diagnostic tools and techniques like immunodiagnostics, molecular diagnostics and clinical diagnosis available for diagnosis of various diseases. This in general helps them in their day to day life.
- The molecular diagnostic part particularly helps student learn about various forensic techniques as well so that they can apply it in the field of forensic research as well as research in general.

DSE B4: Research Methodology

Studying this paper will help students to understand

- How to select a research problem, review and search the literatures.
- How to design experimental models, collect data and keeping experimental records.
- How to process data and analyze the data.