

DEPARTMENT OF BIOCHEMISTRY
PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE &
POST GRADUATE PROGRAMME (2023 ONWARDS)

NAME OF THE PROGRAMME: BACHELOR OF BIOCHEMISTRY– PROGRAMME OUTCOME	
PO1	Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study
PO2	Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations.
PO5	Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from

	data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation
PO7	Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team
PO8	Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
PO10	Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO12	Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO13	Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PO14	Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to

	the right destination, in a smooth and efficient way.
PO15	Lifelong learning: Ability to acquire knowledge and skills, including, learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

NAME OF THE PROGRAMME: B.Sc. BIOCHEMISTRY – COURSE OUTCOMES	
SEMESTER I	
NUTRITIONAL BIOCHEMISTRY	<ol style="list-style-type: none"> 1, Cognizance of basic food groups viz. Carbohydrates, proteins and lipids and their nutritional aspects as well as calorific value. 2. Identify and explain nutrients in foods and the specific functions in maintaining health. 3. Classify the food groups and its significance, 4. Understand the effect of food additives. 5. Describe the importance of nutraceuticals and pigments.
HEALTH AND NUTRITION	<ol style="list-style-type: none"> 1. Understand about the importance of health and diet. 2. Discuss about the classification properties and deficiencies of vitamins. 3. Understand about sources and functions of fats and lipids on health. 4. Detail about the different types of minerals and its role in health. 5. Relate the role of proteins and carbohydrates on health.

BASIC OF BIOCHEMISTRY	<ol style="list-style-type: none"> 1.Students should be able to identify and describe the structure, function, and properties of major biomolecules such as carbohydrates, lipids, proteins, and nucleic acids. 2.Students should understand the principles of enzyme kinetics, enzyme regulation, and the role of enzymes in catalyzing biochemical reactions. 3.Students should understand the principles of energy transfer in biological systems, including ATP synthesis and hydrolysis, and the role of energy carriers such as NADH and FADH₂.
SEMESTER-II	
CELL BIOLOGY	<ol style="list-style-type: none"> 1.Explain the concept of acids, bases and ionic equilibria; periodic properties of s and p block elements, preparation and properties of aliphatic and aromatic hydrocarbons 2.Discuss the periodic properties of s and p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids 3.Classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons 4.Explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements 5. Assess the application of hard and soft acids indicators, buffers, compounds of s and p block elements and hydrocarbons

MEDICINAL DIET	<ol style="list-style-type: none"> 1.Possess basic knowledge about diet 2.Sketch diet plan for GI diseases 3.Sketch diet plan for liver diseases 4.Sketch a diet plan for Infectious diseases 5.Prepare diet chart for Diabetes Renal and Cardio-vascular diseases
FIRST AID	<ol style="list-style-type: none"> 1, Discuss on the rules of first aid, dealing during emergency and first aid techniques 2.Understand the first aid techniques to be given during different types of respiratory problems 3.Provide first aid for injuries, shocks and bone injury 4.Detail on the first aid to be given for unconsciousness, stroke, fits and convulsions 5.Gain expertise in giving first aid for insect bites and chemical poisoning
SEMESTER III	
BIOMOLECULES	<ol style="list-style-type: none"> 1.Know about the composition of various cosmetic products 2.Understand chemical aspects and applications of hair care and dental care and skin care products. 3. Understand chemical aspects and applications of perfumes and skin care products. 4.To understand the methods of beauty treatments their advantages and disadvantage 5.Understand the hazards of cosmetic products.
TISSUE CULTURE	<ol style="list-style-type: none"> 1.Introduction to plant tissue culture 2. Brief knowledge on preparation of tissue culture media 3. Understanding on different methods of gene transfer 4. Gain knowledge on plant and animal cell culture techniques 5. Study of applications of genetically modified plants and animals.

PLANT BIOCHEMISTRY AND PLANT THERAPEUTICS	<p>1. Gain knowledge on photosynthetic apparatus, pigments present, pathways, and significance of photosynthesis.</p> <p>2. Learn in detail about the structure, types, sources, biosynthesis and functions of secondary metabolites.</p> <p>3. Understand the structure and functions of plant hormones.</p> <p>4. Discuss about free radicals, types and its harmful effects. Role of enzymatic and non-enzymatic antioxidant in defence mechanism, prevention in disease.</p> <p>Identify the plants with antidiabetic, anticancer, antibacterial, antiviral, anti-malaria and anti-inflammatory properties.</p>
SEMESTER IV	
BIOCHEMICAL TECHNIQUES	<p>1. Describe types of rotors and identify the centrifugation Technique for the separation of biomolecules.</p> <p>2. Demonstrate the principles, operational procedure and applications of planar and column chromatography.</p> <p>3. Specify the factors and explain the separation of DNA and protein using electrophoretic technique.</p> <p>4. State Beer's Law and illustrate the instrumentation and uses of colorimeter and spectrophotometer.</p> <p>5. Enumerate various methods of measurement of radioactivity and safety aspects of radioactive isotopes.</p>
BIOCHEMICAL PHARMACOLOGY	<p>1. Explain molecular logic of living organisms, composition of blood and blood coagulation</p> <p>2. Explain synthesis and properties of amino acids, determination of structure of peptides and proteins</p> <p>3. Explain factors influencing enzyme activity and vitamins as coenzymes</p> <p>4. Explain RNA and DNA structure and functions</p> <p>5. Explain biological significance of simple and compound lipids</p>
SEMESTER V	

ENZYMES	<ol style="list-style-type: none"> 1. Identify the major classes of enzymes, differentiate between a chemical catalyst and a biocatalyst and define the units of enzymes. 2. Explain the mechanism of enzyme catalysis and the role of coenzymes in enzyme action. 3. Illustrate the steady state kinetics, interpret MM plot and LB plot based on kinetics data, and determine K_m and V_{max}. 4. Distinguish the types of inhibition along with its importance in biochemical reactions. 5. Comprehend the various methods for production of immobilized enzymes and discuss the application of enzymes in clinical diagnosis and various industries.
INTERMEDIARY METABOLISM	<ol style="list-style-type: none"> 1. State the concepts of bioenergetics and illustrate the mechanism of flow of electrons and the production of ATP. 2. Elaborate the biochemical reactions and integration of pathways of carbohydrate metabolism. 3. Sketch the oxidation and biosynthesis of fatty acids, phospholipids, triglycerides and cholesterol with suitable examples. 4. Explain catabolism of amino acids, synthesis of nonessential amino acids and specialized products from amino acids. 5. Describe the metabolism of nucleic acids with necessary illustrations and its regulation.
CLINICAL BIOCHEMISTRY	<ol style="list-style-type: none"> 1. Explain the concepts of hormones and their importance to maintain glucose and types of Diabetes, diagnosis and treatment. 2. Analyze the lipid profile and different deficiency state. 3. Describe the liver and kidney functions and specific diagnostic methods used for biological sample. 4. Detail about the composition of gastric juice and special test for diagnosis. 5. Elaborate the enzyme markers used for diagnostic studies.

BIOENTREPRENEURS HIP	<ol style="list-style-type: none"> 1. Understand the concept and scope for entrepreneurship 2. Identify various operations involved in a venture creation 3. Gather funding and launching a winning business 4. Nurture the organization and harvest the rewards 5. Illustrate about the Business incubator centres and Bio entrepreneurship.
SEMESTER VI	
MOLECULAR BIOLOGY	<ol style="list-style-type: none"> 1. Illustrate the Central Dogma of molecular biology, explain the multiplication of DNA in the cell and describe the types and modes of replication. 2. Elaborate the mechanism of transcribing DNA into RNA, discuss the formation of different types of RNA. 3. Decipher the genetic code and summarize the process of translation. 4. Comprehend the principles of gene expression and explain the concept of operon in prokaryotes. 5. Distinguish the types of mutations and explain the various mechanisms of DNA repair.
HUMAN PHYSIOLOGY	<ol style="list-style-type: none"> 1. Explain the exchange of gases, design of blood vessels and cardiac cycle. 2. Summarize the events in transmission of nerve impulses and mechanism of muscle contraction. 3. Elaborate the structure and functions of digestive system, structure of nephron and mechanism of urine formation and role of kidney in maintenance of PH. 4. Describe the process of Oogenesis, Spermatogenesis, Fertilization, and Parturition. 5. Understand the role of different hormones that regulate metabolism, growth, glucose homeostasis and reproductive

	function.
BIOTECHNOLOGY	<ol style="list-style-type: none"> 1.Acquire knowledge on rDNA technology, DNA manipulation, and use of restriction endonuclease. 2. Get acquainted with the use of cloning and vectors in plant tissue culture. 3. Understand the methods for production of proteins using recombinant DNA technology and their applications, basics of tissue culture, trans genesis, stem cell technology, risks, and safety aspects and patenting in biotechnology. 4. Gain knowledge about the importance of gene and gene manipulation technologies. 5. Know the concept fermentation technology and its applications.
IMMUNOLOGY	<ol style="list-style-type: none"> 1Associate structure and function of the organs involved in our body's natural Defence 2. Classify antigens and antibodies and the role of lymphocytes in defending the host. 3. Describe the types of immunity and the uses of vaccines 4. Understand the immune related diseases and mechanism of transplantation 5. Examine the immunological tests and relate it to the immune status of an Individual
MEDICAL CODING	<ol style="list-style-type: none"> 1.Explaining the basic concept of coding and its application. Possess the knowledge about the First aid and CPR 2.Possess the knowledge about medical terminology used in medical coding industry 3.Possess the knowledge about the ICD-10 CM international classification of diseases based on WHO 4.Possess the knowledge about the CPT codes used for diseases as

	<p>per American Medical Association (AMA)</p> <p>5. Understand CPT coding and its types</p>
BASICS OF FORENSIC SCIENCE	<p>1. Gain knowledge on basics of forensic science and method for collection and preservation of samples.</p> <p>2. Assess the paternity, maternity problems and DNA profiling.</p> <p>3. Identify the presence of alcohol, insecticides and pesticides in body fluids.</p> <p>4. Detail on the test performed to identify the presence of drugs and poisons in body fluids.</p> <p>5. Identify species and sex from the available body fluids.</p>
ALLIED COURSE OFFERED BY BIOCHEMISTRY	
ALLIED BIOCHEMISTRY I	<p>1. Classify the structure of carbohydrates and its properties.</p> <p>2. Explain the metabolism of carbohydrates and its significance.</p> <p>3. Classify amino acids and its properties.</p> <p>4. Explain the classification and elucidate the different levels of structural organization of proteins.</p> <p>5. Identify the disease caused by the deficiency of vitamins</p>
ALLIED BIOCHEMISTRY II	<p>1. Elaborate on classification, structure, properties, functions and characterization of lipids.</p> <p>2. Discuss the metabolism of lipids and its importance.</p> <p>3. Explain about structure, properties and functions of nucleic acids.</p> <p>4. Derive Michaelis Menten equation and concepts of enzyme inhibition.</p> <p>5. Classify the Hormones and its biological functions.</p>

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NAME OF THE PROGRAMME: M.Sc.BIOCHEMISTRY– PROGRAMME OUTCOME	
PO1	To make students understand the importance of biochemistry as a subject that deals with life processes, as well as the concepts, theories and experimental approaches followed in biochemistry, in order to pursue a research career, either in an industry or academic setting.
PO2	To develop analytical and problem-solving skills
PO3	To create an awareness among the students on the interconnection between the interdisciplinary areas of biochemistry.
PO4	To give the necessary practical skills required for biochemical techniques and analysis.
PO5	To develop a communication and writing skills in students.
PO6	To develop leadership and teamwork skills
PO7	To emphasize the importance of good academic and work ethics and their social implications.
PO8	To emphasize the importance of continuous learning and to promote lifelong learning and career development
PO9	To teach students how to retrieve information from a variety of sources, including libraries, databases and the internet.
PO10	To teach students to identify, design and execute a research problem, analyze and interpret data and learn time and resource management.

NAME OF THE PROGRAMME: M.Sc. BIOCHEMISTRY – COURSE OUTCOMES	
SEMESTER I	
BASICS OF BIOCHEMISTRY	1.Explain the chemical structure and functions of carbohydrates. 2.Using the knowledge of lipid structure and function, explain how it plays a role in Signalling pathways 3. Describe the various levels of structural organisation of proteins and the role of proteins in biological system 4.Apply the knowledge of proteins in cell-cell interactions. 5.Applying the knowledge of nucleic acid sequencing in research and diagnosis.
BIOCHEMICAL AND MOLECULAR BIOLOGY TECHNIQUES	1.Attain good knowledge in modern used in biochemical investigation and microscopy and apply the experimental protocols to plan and carry out simple investigations in biological research. 2. Demonstrate knowledge to implement the theoretical basis of chromatography in upcoming practical course work. 3.Demonstrate knowledge to implement the theoretical basis of electrophoretic techniques in research work.

	<p>4. Tackle more advanced and specialized spectroscopic techniques that are pertinent to research.</p> <p>5. Tackle more advanced and specialized radioisotope and centrifugation techniques that are pertinent to research work.</p>
MICROBIOLOGY & IMMUNOLOGY	<p>1.To classify (by both ancient and modern modes) different types of microorganisms and explain life cycle of the microbes</p> <p>2. To recognize the microorganisms involved in decay of foods and will be able to apply various counteracting measures. The students also will be able to relate the role of certain beneficial microbes in day-to-day's food consumption.</p> <p>3. To understand the common pathogenic bacterial and fungi that cause toxic effects and also will be able to employ curative measures.</p> <p>4. To analyse various features of wide variety of antimicrobial agents along with their mode of action, in addition, being able to apprehend the valuable potentials of traditional and easily available herbs.</p> <p>5. To apply knowledge gained in production of industrially important products as both pharmaceutical and nutraceutical.</p>
ENERGY AND DRUG METABOLISM	<p>1.Appreciate the relationship between free energy and redox potential and will be able to justify the role of biological oxidation and energy rich compounds in maintaining the energy level of the system</p> <p>2. Gain knowledge on role of mitochondria in the production of energy currency of the cell</p> <p>3. Acquaint with the process of photosynthesis</p> <p>4. Comprehend on the diverse role of TCA cycle and the energy obtained on complete oxidation of glucose and fatty acid</p> <p>5. Correlate the avenues available to metabolize the xenobiotics</p>
LABORATORY COURSE ON BIOMOLECULES AND BIOCHEMICAL TECHNIQUES	<p>1.The student will be able to acquire knowledge and skill in the techniques used in the isolation, purification and estimation of different biomolecules that are widely employed in research</p> <p>2.The students will get acquainted with Principle, Instrumentation and method of Performing UV absorption studies of DNA, Protein and interpreting the alteration occurred during the process of denaturation</p> <p>3.The student will be fine-tune in handling the instruments like colorimeter, spectrophotometer and will be able to estimate the biomolecules and minerals from the given samples</p> <p>4. The student, in addition to acquiring skill in performing various biochemical techniques can also learn to detect presence of phytochemicals and quantify them in the plant sample.</p> <p>5.The students will develop skill in analytical techniques like subcellular fractionation, Paper, Column and Thin layer Chromatography and the group experiments will enable them to build learning skills like team work, Problem solving, Communication ability.</p>
SEMESTER-II	

ENZYMOLGY	<p>1.Describe the catalytic mechanisms employed by enzymes</p> <p>2: Choose and use the appropriate methods to isolate and purify enzymes and check the purity of the enzyme .</p> <p>3: Analyze enzyme kinetic data graphically, calculate kinetic parameters, determine the mechanism of inhibition by a drug/chemical and analyze options for applying enzymes and their inhibitors in medicine</p> <p>4: Explain allosterism and cooperativity and differentiate Michaelis-Menten kinetics from sigmoidal kinetics. The role played by enzymes in the regulation of vital cellular processes will be appreciated.</p> <p>5: Highlight the use of enzymes in industries and biomedicine</p>
CELLULAR METABOLISM	<p>1.Appreciate the modes of synthesis and degradation of glucose and will be able to justify the pros and cons of maintain the blood sugar level</p> <p>2. Gain knowledge on polysaccharide metabolism and glycogen storage disease</p> <p>3. Acquaint with the making and braking of nucleotides</p> <p>4. Differentiate the diverse reaction a particular amino acid can experience</p> <p>5. Correlate the disturbance of metabolic reactions to clinical manifestations with reference to heme and sulphur metabolism.</p>
LAB COURSE IN ENZYMOLOGY , MICROBIOLOGY AND CELL BIOLOGY	<p>1.The student will be able to employ the relevant techniques for isolation and purification of enzymes and gain skill in kinetic studies which is essential for research activity</p> <p>2. Student will acquire ability in performing enzyme assay, and explicate the methods that form the basis of enzyme characterization.</p> <p>3. Learn the Basic concepts in microbiology and cell biology which will be helpful for interdisciplinary research work.</p> <p>4. Students will be trained in separation techniques used in molecular Biology which will be supportive in their future research</p> <p>5. Industrial visits will provide the students with an opportunity to learn practically through interaction, working methods and employment practices. Students will have an exposure to Industrial standard and current work practices</p>

BIOSTATISTICS & DATA SCIENCE	<p>1. Concepts of statistical population and sample, variables and attributes. Tabular and graphical representation of data based on variables.</p> <p>2: Conditions for the consistency' and criteria for the independence of data based on attributes. Measures of central tendency, Dispersion, Skewness and Kurtosis.</p> <p>3: Learning different sampling methods and analysing statistical significance.</p> <p>4: Understanding students t test , ANOVA , Chi square test to analyse the significance of various research.</p> <p>5: Learning on data science, algorithm for machine learning, artificial intelligence and big data, their applications in clinical and pharma domain</p>
BIOSAFETY, LAB SAFETY AND IPR	<p>1. To understand and implement various aspects of biosafety and carry out risk assessment of products in biological research</p> <p>2. Understand the basic concepts of ethics and safety that are essential for different disciplines of science and procedures involved and protection of intellectual property and related rights.</p> <p>3. To appreciate the intellectual property rights and its implementation of on the invention related to biological research.</p> <p>4. To understand the statutory bodies that regulate the property rights and its validity in various countries.</p> <p>5. Critique the ethical concerns associated with modern biotechnology processes and plan accordingly.</p>
NUTRITIONAL BIOCHEMISTRY	<p>1. Plan a balanced diet based on an individual's energy requirement, Assess nutritional status of an individual</p> <p>2. Describe the biochemical, physiological and nutritional functions of macronutrients and their integrated role. Understand the role played by anti-nutritional factors</p> <p>3. Evaluate the functions of vitamins and minerals ,and fluids and electrolyte balance in different physiological states and in sports persons</p> <p>4. Identify nutritional deficiency conditions , its prevention and dietary management</p> <p>5. Acquire knowledge about the importance of balanced diet and diet therapy</p>
	<p>1. After studying unit-1, the student will be able to know the nature of human rights its origin , the theories, the movements in the march of human rights and the facets of future of human rights.</p> <p>2. After studying unit-2, the student will be able to know the international dimension of human rights, the role of UN and the global effort in formulating conventions and declarations</p> <p>3. After studying unit-3, the student will be able to Perceive the</p>

	<p>regional developments of human rights in Europe , Africa and Asia and the enforceable value of human rights in international arena.</p> <p>4. After studying unit-4, the student will be able to have knowledge on the human rights perspectives in India, more developed by its constitution and special legislations</p> <p>5. After studying unit-5, the student will be able to know the redressal mechanism made available in case of human rights violation confined to India.</p>
SEMESTER III	
PHYSIOLOGY AND CELL BIOLOGY	<p>1. specifically understand the biological and chemical processes within a human cell</p> <p>2. identify and prevent diseases</p> <p>3. understand defects in digestion, nutritional deficiencies and intolerances, and gastrointestinal pathologies</p> <p>4. identify general characteristics in individuals with imbalances of acid- base, fluid and electrolytes.</p> <p>5. process the mechanism: the transmission of biochemical information between cell membrane and nucleus.</p>
CLINICAL BIOCHEMISTRY	<p>1. To appreciate the biological significance of sample collection and awareness of the diagnostic/screening tests to detect common noncommunicable diseases so as to understand role of laboratory investigations for biochemical parameters and understand the disorders associated with blood cells</p> <p>2. To understand the etiology of metabolic diseases like diabetes and atherosclerosis and avoid such lifestyle disorders by healthy eating and correlate the symptoms with underlying pathology based on diagnostic and prognostic markers.</p> <p>3. To understand the diagnostic application of serum/plasma enzymes to correlate their levels with the organ pathologies associated with specific diseases.</p> <p>4. To appreciate the role of pre and post-natal diagnosis leading to healthy progeny.</p> <p>5. To link the serum hormone levels and clinical symptoms with underlying hormonal disturbances. To review the onward transmission of signal via downstream signaling molecules from cell surface to the nucleus by different pathways by comparing and contrasting them and critically evaluate the network between them resulting in the biological outcome.</p>

LABORATORY COURSE ON CLINICAL BIOCHEMISTRY	<p>1.The student will be able to acquire knowledge and skill in hematology techniques. They will get familiar with methods and knowledge to interpret the electrolyte concentration in serum</p> <p>2. The student will be able to assess the Liver Function and interpret the biochemical investigation in a given clinical situation</p> <p>3.Skill to perform the Renal function test to assess the function of Kidney and report the abnormal parameters with reference range will be achieved by the student</p> <p>4. To estimate the blood glucose content and lipid profile , to evaluate the alterations and record the observation in accordance to reference range will be acquired by the student</p> <p>5: The Group Experiments will support them to acquire practical skills to work in health care sector and assist them to understand the automation process in clinical labs.</p>
MOLECULAR BIOLOGY	<p>1.Comprehend the organization of genomes, the molecular basis of DNA replication, recombination and transposition, the significance of these processes, the various ways in which the DNA can be damaged leading to mutations and lesions and the different ways in which they are repaired.</p> <p>2: Gain knowledge about how genes are transcribed and translated in prokaryotes and eukaryotes and how these processes are regulated, recognize the nature of the genetic code and the various experimental approaches used to crack the code</p> <p>3: Acquire knowledge of the molecular basis of RNA processing and RNA splicing and the various human pathologies that can result from defects of RNA modification.</p> <p>4: Comprehend the techniques of gene silencing and its applications.</p> <p>5: Apply the knowledge they have gained in understanding the above vital life processes to enhancing their analytical and problemsolving skills and develop an interest to pursue high quality research.</p>
BIOCHEMICAL TOXICOLOGY	<p>1.To appreciate and understand the role of toxicological biomarkers to assess drug toxicities.</p> <p>2: To conceive the role of disposition of drug in human system and their metabolism and methodologies pertaining to toxicological studies.</p> <p>3: To understand and evaluate the functions of different organs on drug disposition and associated drug toxicities.</p> <p>4 :To understand the toxicological response to foreign compounds and their pharmacological, physiological and biochemical effects.</p> <p>5: To link the mechanism of toxicity and clinical symptoms with underlying physiological disturbances.</p>
MOLECULAR BASIS OF DISEASES AND THERAPEUTIC STRATEGIES	<p>1.Overall view about the complications of diabetes mellitus and its management.</p> <p>2.Comprehensive understanding of the concepts of cancer biology and implicating the theoretical concepts for further research</p> <p>3.Understand and appreciate the pathophysiology of conditions</p>

	<p>affecting the nervous system.</p> <p>4. A thorough knowledge of renal and cardiac diseases with emphasis related to mechanistic aspects and therapeutic interventions.</p> <p>5. A thorough knowledge on the experimental models of noncommunicable diseases that will be applied for future research or project dissertation. An in-depth knowledge on development of drugs against non-communicable diseases.</p>
SEMESTER IV	
GENE EDITING, CELL AND GENE THERAPY	<p>1. Ability to read, and evaluate scientific articles within the subjects of immune therapy, gene therapy and cell therapy.</p> <p>2. To clone gene of their interest for several downstream purposes with a robust comprehension about wide variety of applicable gene delivery vectors.</p> <p>3. Be able to provide examples of diseases that can be treated with immune therapy, gene therapy and cell therapy.</p> <p>4. To identify knowledge gaps and need for further research within their chosen topic of immune therapy, gene therapy or cell therapy.</p> <p>5. To critically discuss and reflect on ethical and social aspects of using immune, gene or cell therapy. The student will be persuaded to contemplate on upcoming technologies for futuristic benefits.</p>
PHARMACEUTICAL BIOCHEMISTRY	<p>1. To understand and explain the basic concepts of drug discovery and drug development process.</p> <p>2. To review the different software and computational tools which aid in the design of drugs and its rationalization.</p> <p>3. To analyze the different stages of the drug discovery process with the target & hit identification, assays for drug screening and preclinical studies.</p> <p>4. To understand the various phases of the clinical trials and the method of conduct of clinical trials.</p>
INDUSTRIAL MICROBIOLOGY	<p>1. Students will be able to understand the structure and classification of microorganisms</p> <p>2. Gain knowledge of the uses of microorganisms in various industrial applications</p> <p>3. Understand the concepts of fermentation process, harvest and recovery.</p> <p>4. Students will know the types of microbial fermentation processes and their applications in pharmaceutical industry.</p> <p>5. Students will learn about the use of microorganisms in beverages, dairy and food industries.</p>
DEVELOPMENTAL BIOLOGY AND ENDOCRINOLOGY	<p>1. Grasp knowledge about the background of developmental biology</p> <p>2. Gain abundant knowledge about model organisms and gametogenesis</p> <p>3. Gain knowledge about basic of hormones and their applications.</p> <p>4. Good knowledge about organogenesis</p> <p>5. Learn the basics of endocrine hormones and its functions.</p>

