Bachelor of Science (Biochemistry Genetics & Biotechnology)

Program Outcomes (POs)

Program Outcome	Description
PO1	Propose novel ideas towards solutions to contemporary problems justifying with relevant facts and data
PO2	Develop scientific outlook and see the relevance of science concepts in all aspects of life
PO3	Identify, formulate and analyse complex scientific problems using principles of natural and applied sciences.
PO4	Comprehend concepts, frameworks and inventions through various learning methods and effectively communicate them to others orally and in writing.
PO5	Analyse critically the given scientific data ascribe meaning to them and draw objective conclusions.
PO6	Demonstrate empathetic social concern, skills to effectively participate in civic affairs and democratic decision making.
PO7	Imbibe ethical, moral and social values to become cultured and civilised global citizens.
PO8	Apply concepts of sustainable development to make a difference in dealing with social and environmental issues.
PO9	Develop multidimensional skills and habits as lifelong learners.

Program Specific Outcomes (PSOs)

PSO01	Acquire interdisciplinary knowledge with strengthened fundamentals of Biochemistry, Genetics and Biotechnology.
PSO02	Understand the nuances of basic and applied fields of the subjects offered in the triple major combination like Clinical Biochemistry, Molecular physiology, Population and Biomedical Genetics, Environmental and Industrial Biotechnology and Biostatistics
PSO03	Comprehend the theoretical and practical aspects for industry and research-oriented future.
PSO04	Articulate multifaceted career prospects in health, Pharmaceutical and research sectors with a sound analysis of the pros and cons of the same
PSO05	Appertaining the students with the skills of entrepreneurship

Course Outcomes (COs)

2019-20

Semester	Course Code	Course Name	Course Outcomes (COs)
	16KAN1L01	Kannada	CO1 : To understand ancient Kannada literature form and principles of life as depicted in it. CO2 : Develop creative thinking with the introduction of different literature forms. CO3 : Awareness about gender equality and social harmony. CO4 : Develop business correspondence skills through letter writing. CO5 : Ability to formulate a value based thought process with inclusive approach.
	16SAN1L01	Sanskrit	CO1 : Student will be able to understand Nitishatakam and Viduraniti as political Science CO2 : Develop administrative skills. CO3 : Analyze five principles of Panchatantra for proper examination. CO4 : Evaluate the information and defend the right cause. CO5 : Ability to formulate the value based thought process with inclusive approach.
I	16AENG1L01	Additional English	CO1: Understand representative literary and cultural texts within historical, geographical, and cultural contexts. CO2: Apply critical and theoretical approaches to the reading and analysis of literary and cultural texts in multiple genres.
	16ENG1L02	ENGLISH - I	CO1: Demonstrate a coherent and systematic knowledge of the field of English literature showing an understanding of current theoretical and literary developments in relation to the specific field of English studies. CO2 : Demonstrate a set of basic skills in literary communication and explication of literary practices and process with clarity.

Semester	Course Code	Course Name	Course Outcomes (COs)
	18BCHE1C031	BIOCHEMISTRY CORE I (ESSENTIALS OF CHEMISTRY AND INTRODUCTION TO BIOMEMBRANE)	CO1: Illustrate with examples the determination of oxidation number and expertise in balancing a chemical reaction. CO2: Describe various types of chemical bonding and identify the method of finding bond angle, bond length and lattice energy of a given molecule. CO3: Recognize many fundamental bond forming reactions and their application in organic synthesis. CO4: Identify the structure of various heterocycles & their derivatives and recognize the importance, applications and uses of heterocyclic compounds in organic synthesis. CO5 : Understand the elementary laws of chemical kinetics and reaction mechanisms and differentiate between collision theory and transition state theory of reaction rate.
	18GENT1C04	GENETICS CORE I - FUNDAMENTALS OF GENETICS	CO1: Highlighting the importance of Pre-Mendelian and Mendelian Concepts in Genetics CO2: Extending the Genetic Concepts to other organisms to study them as Model system. CO3: Categorising the organisms based on their importance in the study CO4: Exemplifying numerical and Structural chromosomal aberrations CO5:Outlining the process of Sex determination and sex differentiation
	16BT1C05	BIOTECHNOLOGY CORE I (Cell biology and Biochemistry)	CO1: Discuss the historical perspectives, scope and importance of Biotechnology and establishes its commercial potential. (Understanding) CO2: Illustrate and schematically represent the structural and functional aspects of prokaryotic and eukaryotic cells. (Application) CO3: Assess the role of cellular components in physiology of cells. (Evaluate) CO4: Outline the significance of cellular components in cell division and cell cycle regulation. (Knowledge) CO5: Explain macromolecular structures, classification and their role in metabolic pathways. (Understanding)

Semester	Course Code	Course Name	Course Outcomes (COs)
	16KAN2L01	Kannada	CO1: Students will be able to understand the importance of democracy, elections and responsibility of the younger generation. CO2 Awareness about student life, knowledge acquisition through academics and learning beyond for holistic development. CO3 Analyze and differentiate the cultural beliefs to give up superstitious beliefs. CO4 Evaluate the information based on social concerns and defend the right cause.
	16SAN2L01	Sanskrit	CO1 : Student will be able to understand the importance of the ancient knowledge system CO2 : Develop creative thinking. CO3 : Analyze the situation on time and gravity which in turn will help in decision making. CO4 : 'Evaluate the self' – introspection in day to day life, personality development and thereby contribute for a better harmonious society.
II	16AENG2L01	Additional English	CO1: Recognize and describe the critical approach, ideas, values, and themes contained in the literary writings that affect our culture and society. CO2 : Write analytically in a variety of formats, including essays, speeches, and reflective writings.
	16ENG2L02	ENGLISH - II	CO1: Display knowledge to cultivate a better understanding of values – both literary values that aid us in literary judgment and also values of life at all stages; apply appropriate methodologies for the development of the creative and analytical faculties of students, their overall development of writing, including imaginative writing. CO2 : Cultivate ability to look at and evaluate literary texts as a field of study and as part of the wider network of local and global culture.

Semester	Course Code	Course Name	Course Outcomes (COs)
	18BCHE2C03	BIOCHEMISTRY CORE II (BIOMOLECULES)	CO1: Predict the relative stabilities of metal complexes with different ligands. CO2: Understand and visualize, that stereochemistry concepts are integral to the study of living things. CO3: List the different categories of carbohydrates and interpret why carbohydrates are the preferred energy source for the human body. CO4: Understand the properties of lipids, cholesterol, DNA, RNA, glycoproteins and glycolipids and their importance in biological systems. CO5 : Describe, using examples, the relationship between protein structure and function.
	18GENT2C04	GENETICS CORE II Genome Organization, Linkage and Transposons	CO1: Summarising the principles of extra-chromosomal inheritance using multiple examples. CO2: Illustrates the models of crossing-over, and applies the concepts of linkage and recombination to various organisms. CO3: Construct genetic maps and calculate the distance between genes. CO4: Conceptualizes the significance of Transposons, their evolution, and their role in diseases. CO5: Discusses the implications of Epigenetics and genomic imprinting in human diseases.
	16BT2C05	Biotechnology CORE II (Molecular Genetics)	CO1: Summarizing the identification of genetic material as well as to relate to principles of gene organization and expression of prokaryotic and eukaryotic organisms. (Understanding) CO2: Outlining the process of DNA replication, transcription and translation, facilitating their application in molecular techniques. (Knowledge) CO3: Explain the principles and mechanisms of DNA repair (Understand) CO4: Illustrate the external and internal factors affecting mutations (Illustrate) CO5: Describe gene regulation in prokaryotes and eukaryotes (Understanding)

Semester	Course Code	Course Name	Course Outcomes (COs)
III	18BCHE3C03	Biochemistry CORE III (BIOENERGETICS & METABOLISM I)	CO1: Define the major pathways of intermediary metabolism of biomolecules, and discuss their bioenergetics, physiological adaptation, metabolic and main hormonal regulation, localization and cellular compartmentalization. CO2: Correlate the metabolic activity of tissues and organs with their function. CO3: Discuss how disruptions in intermediary metabolism may lead to disease, and illustrate with selected examples. CO4: Review and consolidate concepts in the areas of Metabolism and Bioenergetics, focusing on the main metabolic pathways in a living cell, how they are regulated and disturbed in disease, and how energy is obtained and transduced to meet the cell's requirements.
	18GENT3C04	GENETICS CORE III Developmental, Behavioral, and Biometrical Genetics	CO1: Differentiates between different biological rhythms and categorises a given behaviour under a distinct class of rhythms CO2: Compare and contrast multiple forms of animal development and behaviour CO3: Analyse and devise theoretical paradigms of human experimentation with respect to personality traits CO4: Elucidate the basis of phenotypic variation in any given plant or animal. CO5:Compute statistical parameters and mathematically justifies the results of artificial selection of commercially important traits.

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	16BT3C05	Biotechnology CORE III (Environmental biotechnology and biostatistics)	CO1: Recognizes various concepts and applications in the field of sensors, chips and bio scrubbers to protect the environment. (Knowledge) CO2: Highlights the various facets of the environment, biodiversity, threats, conservation and contributions towards environment for betterment of the society and mankind (Knowledge) CO3: Explains fundamentals and applications of biostatistics. (Understanding) CO4: Illustrates convenient samples by using sampling theory, calculation of measures of central tendency and dispersion. (Application) CO5: Solve problems related to probability, hypothetical testing and binomial distribution.(Analyze)
	16CENG0A1	ABILITY ENHANCEMENT COURSE (AEC)-1 Communicative English	CO1: To enhance the understanding of LSRW skills and various approaches to language. CO2: Providing an in-depth academic exposure about various forms of communication to enable students to be better speakers and users of language. CO3: Demonstrate a coherent and systematic knowledge of the field of communication through understanding of current linguistic and literary developments. CO4: Demonstrate a set of basic skills in literary communication and explication of literary practices and process with clarity. CO5: Write analytically in a variety of formats, including essays, speeches, and reflective writings.

Semester	Course Code	Course Name	Course Outcomes (COs)
IV	18BCHE4C03	BIOCHEMISTRY CORE IV (METABOLISM II)	CO1: Appreciate the significance of nitrogen balance in the living environment and describe the nitrogen cycle. CO2: Summarize the process of digestion and absorption of amino acids and understand the causes and effects of protein calorie malnutrition such as in Kwashiorkar and Marasmus. CO3: Examine and outline the biosynthetic and catabolic process of the amino acids in the human body and the disorders associated with these processes, and the alternate functions of amino acids as precursors for other cell process. CO4: Illustrate the anabolic and catabolic process of nucleic acids and their significance in human health. CO5 : Correlate all the metabolic pathways in the human system thereby get a thorough understanding of the cell physiology.
	18GENT4C04	GENETICS CORE IV BIOMEDICAL GENETICS	CO1: Illustrate and analyse pedigrees. CO2: Predict the major dominant and recessive genetic disorders in the human population. CO3: Outline the characteristics of cell cycle, cell senescence, cancer genetics and neurogenetic disorders. CO4: Comprehensive analysis of prenatal diagnosis and genetic counselling. CO5: Emphasizes the fundamental concepts of pharmacogenetics and drug metabolism.
	16BT4C05	Biotechnology CORE IV (Industrial biotechnology)	CO1: Explain the history, fundamental principles and evolution of bioprocess engineering. (Understanding) CO2: Discuss the multidimensional approaches involved in screening and selection of strains. (Understanding) CO3: Distinguishing between the types of fermentations, equipments , media and sterilization techniques used in fermentation technology (Analyze) CO4: Discuss about the upstream and downstream processing parameters (Knowledge) CO5: Critically assess the facets of microbial productions, immobilization and intellectual property rights and patenting.(Evaluate)

Semester	Course Code	Course Name	Course Outcomes (COs)
	19MENVI0VE2	Environmental Studies	CO1 - Understanding the nature of our Environment and itsimportance in real Life CO2 - To summarize the basic concepts of ecosystems and their functions CO3 - To Classify the organisms based on the geographical areas, Ecological niche and Threats faced CO4 - Explain the causes and outcomes of Environmental Pollution on this planet CO5 - To create an awareness about the possible solutions to the environmental problems faced by mankind. CO6 - To develop the right attitude towards the environment which eventually helps to deal with environmental problems
V	16MAN0G7	GENERIC CENTRIC ELECTIVE (GE) -1 Human resource management OR	CO1: Demonstrate an understanding of key terms, theories/concepts and practices within the field of HRM CO2: Provide innovative solutions to problems in the fields of HRM and be able to identify and appreciate the significance of the ethical issues in HR CO3: Demonstrate competence in communicating and exchanging ideas in a group context CO4: Work effectively with colleagues with diverse skills, experience levels and way of thinking CO5: Evaluate HRM related social, cultural, ethical and environmental responsibilities and issues in a global context CO6 :To integrate the knowledge of HR practices Related monetary benefits to avail within the organisation.

Semester	Course Code	Course Name	Course Outcomes (COs)
	16MATH5G021	GENERIC CENTRIC ELECTIVE (GE) -1 Elements of Mathematics	CO1: Learn several fundamental concepts and applications of mathematics. CO2: Analyse problems involving matrices, understand the process of transforming matrices using elementary operations, gain the skill of obtaining ranks of matrices and diagonalize certain matrices. CO3: Gain the skill sets in understanding ratios and proportions CO4: Analyze uncertain behavior in nature using probability models. CO5: Research on optimization techniques
	16PHY5G01	GENERIC CENTRIC ELECTIVE (GE) -2 Elements of Physics OR	CO1 :Understanding of basic principles of interference light, diffraction of light, polarization of light, optical microscopes and Abbey's refractometer. CO2:Learn basics of X-ray crystallography and bio molecular structure investigation using Bragg's law. CO3 :Get good understanding of fluid dynamics principle and spectroscopic techniques namely Atomic absorption spectroscopy, IR-spectroscopy, NMR spectroscopy. CO4:Acquire good basic experimental skills in optics, spectroscopy and X-ray diffraction data analysis.
	16ECO5G01	GENERIC CENTRIC ELECTIVE (GE) -2 Elements of Entrepreneurship	CO1 :Outline the function of the entrepreneur in the successful, commercial application of innovations and recall the different opportunities and successful growth stories. CO2 :Learn how to start an enterprise and design business plans that are suitable for funding by considering all dimensions of business. CO3 :Prioritize personal attributes that enable best use of entrepreneurial opportunities CO4 :Examine Economic conditions with higher level knowledge and understanding of contemporary trends in e-commerce and business finance. CO5 :Explore entrepreneurial leadership and management style.

Semester	Course Code	Course Name	Course Outcomes (COs)
	18BCHE5S031	SKILL ENHANCING COURSE (SEC) (BIOCHEMISTRY) – 2 Tools and techniques in Biochemistry OR	CO1 : Demonstrate the separation and identification of biomolecules using chromatographic methods. CO2 : Illustrate the estimation of metals present in biological samples using suitable reactions. CO3 : Examine the use of pH meter for deriving the endpoint of an acid base titration CO4 : Compare the UV-visible spectrum of metals and biomolecules using spectrophotometry
	18BCHE5S032	SKILL ENHANCING COURSE (SEC) (BIOCHEMISTRY) – 2 Protein purification methods	CO1 : Recommend suitable techniques for sample handling, storage, cell disruption, separation, extraction, purification and quantification of proteins. CO2 : Describe the characteristics of enzymes and discuss the effect of various inhibitors, physiological and biochemical conditions on enzyme activity. CO3 : Demonstrate different centrifugation techniques and illustrate their application in biochemistry. CO4 : Define the basic principle operating behind paper, gel electrophoresis and to describe the factors affecting mobility.
	18GENT5S041	SKILL ENHANCING COURSE (SEC) (GENETICS) – 3 IMMUNOLOGY	C01:Memorise the cells and organs of the immune system CO2:Explain the essential concepts of immunity and the working of its innate and adaptive pathways. CO3:Describe the technologies and tools in immunogenetics
	18GENT5S042	SKILL ENHANCING COURSE (SEC) (GENETICS) – 3 TOXICOLOGY	CO1 :Explain the characteristics and composition of toxic substances CO2:Explain the Mechanism of toxicity, fate of Xenobiotics and the effects of environmental toxins on Human Physiology CO3:Illustrate the parameters for Dose response relationships

Semester	Course Code	Course Name	Course Outcomes (COs)
	16BT5S051	SKILL ENHANCING COURSE (SEC) (BIOTECHNOLOGY) – 4 Recombinant DNA Technology OR	CO1: Explain the role of enzymes and vectors employed in RDT. (Understanding) CO2: Illustrate the tools and techniques of gene isolation and transfer. (Apply) CO3: Recall the methodology of screening and selection of recombinants. (Knowledge) CO4: Asses the use of molecular techniques in genetic engineering (Evaluate) CO5: Apply ideas of gene cloning in medicine and agriculture (Apply)
	16BT5S052	SKILL ENHANCING COURSE (SEC) (Biotechnology) – 4 Plant tissue Culture	CO1: Discuss the significance of tissue culture. (Understanding) CO2: Illustrate the steps involved in media preparation and propagation of plants. (Apply) CO3: Assess various techniques involved in protoplast isolation and cultivation of transgenic plants. (Evaluate) CO4: Develop theoretical facets of plant tissue culture into entrepreneurial startups. (Create)
VI	18BCHE6D101	DISCIPLINE SPECIFIC ELECTIVE (DSE)-C Molecular Physiology	CO1 : Differentiate the mechanism of action of various neurotransmitters and relate with the biochemical basis of neurological disorders CO2 : Compare and demonstrate the endocrine signal transduction pathways which includes second messengers, intra and intercellular signalling CO3 : Assess the primary events that occur in visual excitation, nerve impulse and colour vision CO4 : Discuss the mechanism of cell division, cell arrest and can judge the importance of cell cycle regulatory factors that helps to prevent cancer CO5 : Recommend the importance of apoptosis relating to cancer and speculate the signs of cancer
	18BCHE6D102	DISCIPLINE SPECIFIC ELECTIVE (DSE)-C Nutrition and clinical Biochemistry	CO1 : Interpret and apply the basic concepts of nutrition and clinical biochemistry. CO2 : Design a diet chart based on the normal dietary requirements of various dietary components and their nutritional quality. CO3: Appraise the harmful effects of anti-vitamins, Natural toxicants and adulterants. CO4 : Review diagnostic test results for assessing organ functions and diseases

Semester	Course Code	Course Name	Course Outcomes (COs)
	18GENT6D101	DISCIPLINE SPECIFIC ELECTIVE (DSE)-M (GENETICS) HUMAN ANATOMY AND PHYSIOLOGY	CO1 :Recognize and identify principal tissue structures CO2:Understanding the role of each body systems in maintaining homeostasis CO3:Demonstrate how these human organ systems are interrelated to apply a holistic approach to human health CO4:Illustrate the structure of human anatomy and physiology CO5:Discuss the functions of important physiological systems of human cardio -respiratory, renal, reproductive and metabolic systems
	16BT6D301	DISCIPLINE SPECIFIC ELECTIVE (DSE)-Bt (BIOTECHNOLOGY) BIOINFORMATICS	CO1: Identify the Scope of Computers in the field of Bioinformatics (Knowledge) CO2: Describe the algorithms, tools and databases and technologies used in Bioinformatics (Understand) CO3: Application of Software tools to extract and interpret the Biological data (apply) CO4: Analyze the Biological data created by using different tools. (Analyze) CO5: Integrate the concept of 'OMICS' and Bioinformatics tools to gain the experience of handling them in the laboratory. (Analyze)
	16BT6D302	Discipline Specific Elective (DSE)-Bt (Biotechnology) Applied Genetics	CO1 :Demonstrates proficiency in applying the quantitative and analytical skills necessary for research in science CO2 :Ability to explain and comment on the current role and potential of Genetics in various fields. CO3 :Evaluate the ethical implications CO4 :Establishes the relationship between molecular and cellular processes in evolutionary biology.

Semester	Course Code	Course Name	Course Outcomes (COs)
	16CS0G5	GENERIC ELECTIVE (GE) -3 Multimedia applications	CO1 : Demonstrate skills to work with formulas and functions and create charts CO2 : Demonstrate skills to enforce data validation and sort and filter data CO3: Create slide presentations that include text, graphics, animation, and transitions. CO4: Describe the usage of text in multimedia design. CO5: Discuss audio and video standards, formats and technology, Compare and contrast between bitmap and vector graphic. CO6: Examine basic principles and techniques of animation.
	18FS0G3	GENERIC ELECTIVE (GE) -3 Advanced forensic chemistry and toxicology	CO1 :Develop knowledge of Forensic chemistry, forensic toxicology, nature of exhibits, cases, drug of abuse, explosives, arson, chemistry of fire. CO2: Assess the explosion mechanism and process, characteristics and composition of explosives, volatile poisons, animal poisons, plant poisons, chemical warfare agents. CO3 :Examine liquor, petroleum products, explosives, arson evidences, drugs and poisons. CO4: Employ different extraction methods, qualitative analytical techniques, role of toxicologists, significance of toxicological findings. CO5: Recognize alcoholic and non-alcoholic beverages, classification of explosives, classification of poisons, classification of drug of abuse, drugs and cosmetic act, excise act, NDPS act.