K.L.E Society's
Raja Lakhamagouda Science Institute (Autonomous), Belagavi

(PO's/PSO's/CO's)

Program: B. Sc. Botany & Biotechnology (UG01C13)

Programme Outcome

PO1: Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts, theoretical principles and experimental findings in Botany & Biotechnology and its different subfields.

PO2: Critical thinker and problem solver: Ability to employ critical thinking and efficient problem-solving skills in the four basic areas of Botany & Biotechnology.

PO3: Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the field of Botany & Biotechnology, and planning, executing and reporting the results of an experiment or investigation.

PO4: Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.

Programme Specific Outcomes

PSO1: Students will realize and develop an understanding of the impact Botany & Biotechnology on society and apply conceptual understanding of the Botany & Biotechnology in real life.

PSO2: Perform effectively with professional ethics in analytical, scientific and technical domains.

PSO3: Demonstrate subject-related and transferable skills that are relevant to Botany & Biotechnology related job trades and employment opportunities.

Course Outcomes

Semester I

Course Type	Course Code	Course Title	Course Outcome
AECC	**21EN101**	**Generic English-I**	**CO1:** Learn to appreciate literary texts. **CO2:** Obtain the knowledge of literary devices and genres. **CO3:** Acquire the skills of creativity to express one's experiences. **CO4:** Be aware of their social responsibilities. **CO5:** Develop the critical thinking skills.
AECC	**21KA101**	**Kannada**	**CO 1**: Create appreciation for Kannada language and culture through Kannada literature **CO 2:** Creating environmental awareness. **CO 3:** Developing scientific perspective through science literature. **CO 4:** Know the importance and various forms of Kannada Language
AECC	**21HI101**	**Hindi**	**CO1:** Create interest among the students by reading story. **CO2:** Will be familiar with the development sequence of modern Hindi story. **CO3:** Interest towards linguistic correctness will be created. **CO4:** Will be able to acquire writing skills. **CO5:** Know the importance and various forms of Hindi Language.
SEC	**21CS111**	**Digital fluency**	CO1: Have an intelligent conversation on the key concepts and applications of artificial intelligence (AI), Big data analytics (BDA), internet of things (IOT), Cloud computing, and cyber security. CO2: Develop holistically by learning essential skills such as effective communication, problem solving, design thinking, and team work. CO3: Build his or her personal brand has an agile and expensive learner- one who is interested in horizontal and vertical growth?
DSC	**21BO101**	**Microbial diversity and Technology**	**CO 1:** Understand the fascinating diversity, history, evolution in microbes, Microscopy, staining skills and Microbiologists **CO 2:** Gain knowledge on types of microbial culture media, sterilization techniques, measurement of microbial growth and Nutritional types.

			CO 3: Gain laboratory skills such as microbial cultures, identification, preservation of microbes, collection for their applications in research and industry. Comprehend the systematic position, structure, physiology, significance and life cycles of Viruses. **CO 4:** Comprehend the systematic position, structure, physiology and life cycles of Bacteria, Fungi, significance and their impact on humans and environment.
OEC	**21BO111**	**Role of Plants in Human Welfare**	**CO1:** Understand the fascinating diversity of plants used as food. **CO2:** Gain knowledge on types of plant raw materials used in industries. **CO3:** Understand the medicinal aspects of plants. **CO4:** To bring in awareness on Conservation of Plant Resources and biodiversity in general. **CO5:** Recognize the various plants used to increase the aesthetic values and commercial fruit crops.
DSC	**21BO102**	**Microbial diversity and Technology**	**CO1:** To understand the morphological characters and life cycle of Viruses and Bacteria and Grams Staining **CO2:** To understand the vegetative and reproductive structures of various Algae and Fungi, Bryophytes, Pteridophytes and Gymnosperms. **CO3:** To understand the growth forms of various Fungal Fruiting bodies, lichens and Mycorrhiza.
DSC	**21BT101**	**Cell Biology and Genetics**	**CO1:** Develop the knowledge of how the cell is considered to be the structural and functional unit of life by learning in detail about the structure and the functions of different cell organelles. **CO2:** Understanding the cell division in which is an important aspect of growth and development. **CO3:** To communicate the role of Mendelian concepts in the development of the Science and Genetics, and learning about different laws in Genetics, Gene interactions, inheritance and various important aspects. **CO4:** Students will get the knowledge of molecular basis of variability, inheritance, Chromosomal evolutionary aspects, Human genetics and genetic disorders in human.

DSC	**21BT102**	**Cell Biology and Genetics**	**CO1:** Students will learn about handling and Standard Operating Procedures of different instruments being used in biotechnology laboratory **CO2:** The students will acquire knowledge of composition and preparation of different stains and reagents being used to observe the structure and components of the cell. **CO3:** The students will understand the concept of study of divisional stages of cell division including mitosis and meiosis. They will observe the stages of division and can easily differentiate them. **CO4:** Genetics is the study of inheritance. In the practical of genetics the students will learn about the mounting of polythene chromosomes, karyotyping to analyze different diseases in human being and the will learn about solving some of the problems associated with Genetic studies.

Semester II

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN201	Generic English-II	CO1: Learn to appreciate literary texts. CO2: Obtain the knowledge of literary devices and genres. CO3: Acquire the skills of creativity to express one's experiences. CO4: Be aware of their social responsibilities.
AECC	21BO311	Environmental Studies	CO1: define environmental study and ecology with basic principles. CO2: To examine the natural recourses their types and utility. CO3: To identify the environmental usages, types of pollutions and their impact. CO4: To outline the diversity and explain the conservations and its significance.
AECC	21KA201	Kannada-II	CO 1: A good personality is formed by literature based on life values. CO 2: Students become ambitious to build a better life by achieving specific goals. CO3: Inspiring to always be enthusiastic in life. CO4: You will get complete knowledge of modern Kannada poetry.

AECC	21HI201	Hindi-II	**CO1:** Create interest among the students by reading story. **CO2:** Will be familiar with the development sequence of modern Hindi story. **CO3:** Interest towards linguistic correctness will be created. **CO4:** Will be able to acquire writing skills. **CO5:** Know the importance and various forms of Hindi Language.
DSC	21BO201	Diversity of flowering plants	**CO1:** Understand the diversity, morphology, anatomy, reproduction and life cycle of Algae, Algal cultivation and Algal products. **CO2:** Understand the diversity, morphology, anatomy, reproduction and life cycle of Bryophytes and Pteridophytes. Ecological and economic importance of Bryophytes and Bryophyte Fossils. **CO3:** Understand the diversity, morphology, anatomy, reproduction and life cycle of Gymnosperms. Affinities and evolutionary significance, economic importance of Pteridophytes and Gymnosperms. **CO 4:** Understand the evolution of plants through Geological Time scale and Palaeobotany.
OEC	21BO211:	Biofertilizers and Organic Farming	**CO1:** Comprehend the importance of Organic farming and various kinds of manures and bio-fertilizers. **CO2:** Identify with the methods of recycling of bio-degradable wastes. **CO3:** Recognize the microbes used as bio-fertilizers and culturing of the same. **CO4:** Understand the influence of bio-fertilizers on growth and yield of crop plants
DSC	21BO202	Diversity of flowering plants	**CO1**: To know the working mechanism of instruments used to measure microclimatic variables and find pH. **CO2**: To Understand the morphological adaptations of Hydrophytes and Xerophytes. **CO3**: To Understand the morphology of Angiospermic plant parts and its modification and to draw and formulate floral parts. **CO4**: To assign a specimen to Family using the Bentham & Hooker's system of classification and preservation of specimens via Herbarium. **CO5**: Study tour to know the Plant diversity and its habitat.
DSC	21BT201	Microbiological Methods	**CO1:** Instruments considered to be the important part of Practical. The students will learn about the principles and standard operating procedures of different instruments being used in the field of Life Science for research and development

			CO2: Students will understand the importance of aseptic condition for the laboratory work in Biotechnology. They get the knowledge of sterilization and the microbial techniques. **CO3:** Microorganisms are omnipresent. The structure of different microbes which are present in our environment and diseases caused by these microbes will be learnt by the students. **CO4:** The action of antimicrobial agents with example is well understood.
DSC	21BT202	Microbiological Methods	**CO1:** Students will learn about handling and Standard Operating Procedures of different instruments being used in Microbiology laboratory. **CO2:** The students will acquire knowledge method and importance of Sterilization, preparation of media for the growth of microorganisms in the laboratory. **CO3:** The students will understand the inoculation techniques using different pure culture methods and the understand about the colony characterization of bacterial and fungal colonies. **CO4:** Students will acquire the knowledge of staining techniques to observe the microbes and biochemical analysis to understand the character of the microorganism.

Semester III

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN301	Generic English-III	**CO1:** Acquired enhanced LSRW (Listening, Speaking, Reading, Writing) skills **CO2:** Equipped themselves with interpersonal communication skills **CO3:** Augmented presentation and analytical skills **CO4:** Ability to critically analyses, interpret and appreciate literary texts **CO5:** An awareness of social, cultural, religious and ethnic diversities
AECC	21KA301	Kannada-III	**CO1**: By knowing about Bhakti Sahitya, you will have the quality of humanity. **CO2:** Through travel literature, people will learn about the life and culture of different regions **CO3:** The study of ideological literature will lead to revolution. **CO4:** Know the importance and various forms of Kannada Language.

AECC	21HI301	Hindi-III	CO1: Able to understand One Act plays CO2: Learn to write various types of Letters
SEC-2		**Constitution of India**	CO1: To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution. CO2: To identify the importance of fundamental rights as well as fundamental duties. CO3: To understand the functioning of Union, State and Local Governments in Indian federal system.
DSC	21BO301	**Plant Anatomy and Developmental Biology**	CO1: Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept. CO2: Skill development for the proper description of internal structure using botanical terms, their identification and further classification. CO3: Understanding the basic concepts in plant morphogenesis, embryology and organ development.
DSC	21BO302	Practical	CO1: To study elements of Xylem & phloem maceration technique CO2: Thunders and Comparative Anatomy of primary & secondary structure of Dicot & monocot plant organs CO3: To study anomalous secondary growth in Dicots & monocots CO4: To study microsporogenesis, megasporogenesis, types of ovules & placentation
DSC	21BT301	Biotechnology-III	CO 1. Students will understand the different types of Carbohydrates, their detailed structure and properties and also understand about Metabolism of various biological pathways and can understand the different amino acids and amino acid metabolism. CO 2. Students are able to understand the different biological functions and Classification of Lipids, Enzyme Kinetics and typed of enzyme Inhibition and also can understand the different clinical applications of enzymes. CO 3. Students will get to know about the biological role of Vitamins and their deficiency diseases, and also types, structure of Nucleic Acids that is of DNA and RNA, here students also understand the chemical Nature and Structure of different Hormones. CO 4. The applications and techniques of different Bio analytical tools will be understand.

DSC	21BT302	Practical's-III	**CO1:** Students will understand Definitions and calculation of Molarity, Molality, Normality, Mass percent % (w/w), Percent by volume (% v/v), parts per million (ppm), parts per billion (ppb), Dilution of concentrated solutions. **CO2:** Standard solutions, stock solution, solution of acids. Reagent bottle label reading and precautions. Preparation of standard buffers– Acetate, phosphate, Tris and determination of pH of solution using pH meter. **CO3:** Qualitative analysis of Carbohydrates, Proteins , Estimation of maltose by DNS method and proteins by Bradford method and amino acid by Ninhydrin method. Students will also understand Determination of α-amylase activity by DNS method and iodine number of lipids.

Semester IV

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN401	Generic English-IV	**CO1:** Acquired creative, interpretative and critical thinking **CO2:** Skills to communicate confidently and effectively **CO3:** Obtained persuasive and creative social media writing skills **CO4:** Developed analytical and evaluative skills **CO5:** Learnt to identify and understand social contexts and ethical frameworks in the texts
AECC	21KA401	Kannada-IV	**CO 1:** Learn to live in harmony by learning about the oppressed race. **CO 2:** students will live in tolerance with each other. **CO 3:** By understanding the life of common people, one will know the essence of simple life **CO 4:** Know the importance and various forms of Kannada Language
AECC	21HI401	Hindi-III	**CO1**: Able to understand Hindi Novels **CO2**: Able to understand the importance of Mass Media and Communication
SEC-2		**Artificial Intelligence**	**CO1:** To get introduce about the concept of artificial intelligence and machine learning. **CO2:** Understanding data analysis process i.e. preparation, modelling, visualization. **CO3:** It is to learn about the robotics, types of robots and also components of robots.

DSC	21BO401	**Ecology & Conservation Biology**	CO1: Understanding the fundamental concepts in ecology, environmental science and phytogeography. CO2: Concept development in conservation, global ecological crisis, Sustainable development and pros and cons of human intervention. CO3: Enable the student to appreciate bio diversity and the importance of various conservation strategies, laws and regulatory authorities and global issues related to climate change and sustainable development.
DSC	21BO402	Practical-IV	CO1: To Understand the morphological adaptations of Hydrophytes, Xerophytes, Epiphytes and Halophytes. CO2: To know to determine the moisture content and water holding capacity of soil and to analyze waste water for its physico-chemical properties, pH, turbidity, inorganic elements, alkalinity and hardness. CO3: To know the working mechanism of various Ecological instruments and evaluation of the Frequency and density of Plants by Quadrat & Transect method CO4: Project based learning on waste water treatment and pollution.
DSC	21BT401	Biotechnology-IV	CO 1. Students will understand the Molecular structure of genes, Genetic Code and its properties also different experiments to proof DNA and RNA as Genetic material. CO 2. Different proteins involved in the DNA replication process and the DNA damage and repair mechanism, also understand by this unit. CO 3. Students can understand the Mechanism of Transcription, Translation Process and different factors involved in the mechanism. CO 4. The process of Operon concept, gene mapping, and Gene regulation Process will understand.
DSC	21BT402	Practical's-IV	CO1: Students will understand DNA model making, Estimation of DNA, RNA and Protein by DPA, Orcinol, and FCR method respectively. CO2: Students will gain knowledge about Quantification of DNA/Protein by spectroscopic method and Estimation of protein by FCR method, students will also understand Extraction and partial purification of protein from plant source by Ammonium sulphate precipitation.