PROGRAMME: BSC.,

PROGRAMME OUTCOMES

PO1: Scientific Knowledge and Critical Thinking - Apply Scientific principles and analytical thinking to understand, Investigate and solve problems in relevant areas of science.

PO2: Effective Communication - Communicate Scientific concepts, Experimental findings and technical information effectively through oral, written and digital media in English and any Indian language.

PO3: Use of Modern Tools and techniques - utilize modern laboratory instruments, computational tools, digital technologies and science software/platforms effectively for experimentation, data analysis and research.

PO4: Impact of Science on Society - To prepare competent human resource and to develop scientific attitude at local and global levels for social benefits.

PO5: Responsible Citizenship - Apply Scientific Knowledge for Societal development with awareness of constitution, fundamental rights and duties of citizens, public health and safety, Sustainable usage of natural resources, environmental protection and national priorities.

PO6: Ethics and Professional Responsibility - Demonstrate ethical conduct, biosafety practices, integrity and respect for diversity while working individually and collaboratively.

PO7: Communication and Leadership - Communicate scientific concepts effectively through oral, written and digital media, demonstrate leadership quality and work effectively in multidisciplinary teams.

PO8: Lifelong Learning, Innovation and Employability - Engage in lifelong learning, entrepreneurship and professional development to pursue higher education, research and careers in science and technology while contributing to national and global development.

Program matrix: Bachelor of Science (Biochemistry, Botany, Microbiology)

I Semester			
Course type	**Course code**	**Course title**	**Course Outcomes**
DSC	DSC-1	Introduction to Microbiology and Microbial Diversity	**CO1:** Explain the historical development, scope, classification, taxonomy and diversity of microorganisms, and describe the principles and applications of different microscopes used in microbiology. **CO2:** Demonstrate microbiological laboratory safety practices and perform microscopy, staining techniques, sterilization methods and microbial cell measurement using standard laboratory procedures. **CO3:** Differentiate the structural and functional characteristics of prokaryotic and eukaryotic microorganisms, including bacteria, cyanobacteria, algae, fungi and protozoa. **CO4:** Describe the classification, structure and replication of viruses and analyze the significance of microbial diversity in nature, health and industry through observation and interpretation of microbial specimens and models.
DSC	DSC-1	Diversity of Microbes, Algae, Fungi & Phytopathology	**CO1**: Explain the diversity, classification, general characteristics, and economic importance of Mollicutes, Viruses, Bacteria, Cyanobacteria, Algae, Fungi, and Lichens. **CO2**: Describe and compare the structure, life cycles, and reproductive mechanisms of the microorganisms and lower plant groups in the course. **CO3:** Identify, analyze, and recommend appropriate management practices for common plant diseases based on their symptoms, causal organisms, and modes of transmission. **CO4**: Different habitats of microbes, density and the role of microbes in their habitats.
DSC	DSC-1	Foundations of Biochemistry	**CO1:** Explain and apply fundamental chemical principles underlying biochemical systems, including acid–base equilibria, buffer action, electrode-based measurements, basic photochemical laws, and osmotic phenomena. **CO2:** Classify biological systems as solutions or colloids, describe coordination chemistry of biologically relevant metal ions, *relate* metal coordination to the structure and function of key metalloproteins, and trace major nutrient cycles (N, P, O, S, Se) in terms of transformations and biological significance. **CO3:** Identify characteristic structural frameworks of major bioorganic compound classes (acids, heterocycles, steroids, terpenes, flavonoids, alkaloids) and explain their principal biological roles and significance. **CO4:** Apply and analyze the principles of solution preparation—including molarity, molality, normality, dilution, and calibration of volumetric glassware—to perform

			standardization and quantitative estimation using acid–base, redox, and complexometric titrations, and evaluate analytical data to determine the concentration of unknown samples in laboratory experiments.
EVS			**CO1:** Explain the fundamental concepts of environmental studies, sustainability, ecosystems, biodiversity and natural resources. **CO2:** Analyze the causes, impacts and control measures of environmental pollution and asses environmental health risks. **CO3:** Demonstrate knowledge of environmental policies, legislations, international agreements and conservation practices relevant to environmental protection. **CO4:** Evaluate the impact of human activities, population growth, disasters and environmental movements on society and propose sustainable solutions for environmental conservation.
AECC	AECC-1	Symphony I	**CO1**: Interpret and appreciate literary elements in selected poems. **CO2**: Analyse the narrative techniques and themes in short stories. **CO3**: Evaluate perspectives in essays on science and human values. **CO4**: Apply grammar rules in punctuation, articles, prepositions, and subject-verb agreement.
AECC	AECC-1	ಬಿ.ಎಸ್‌ಸಿ ಪತ್ರಿಕೆ-೧ ವಿಜ್ಞಾನ ಕನ್ನಡ-೧	**CO1**. ಭಾಷೆಯ ಸಾಧ್ಯತೆಗಳ ಅರಿವು ಮೂಡಿಸುವುದು. **CO2**. ಮಾತೃಭಾಷೆಯನ್ನು ಅಭಿವ್ಯಕ್ತಿ ಪಡಿಸುವ ಸಾಮರ್ಥ್ಯ ವೃದ್ಧಿಸ¬ಲು ಸಹಕರಿಸುವುದು. **CO3**. ಬರವಣಿಗೆಯ ಕೌಶಲ್ಯ ಹೆಚ್ಚಿಸುತ್ತದೆ. **CO4**. ಸ್ವತಂತ್ರವಾಗಿ ಅಭಿಪ್ರಾಯ ವ್ಯಕ್ತಪಡಿಸುವ ಆತ್ಮವಿಶ್ವಾಸ ಮೂಡಿಸಲು ಸಹಕಾರಿ.
AECC	AECC-1	Sabha Parva & Nalopakhyana Sangraha (Lakshmana Suri), Ajanta Shabda, Swara Sandhi, Samasa (Tatpurusha, Karmadharaya, Dvigu).	**CO1:** Analyze classical epic prose style and extract moral values from the stories of the Mahabharata. **CO2:** Identify key characters, plotlines, and significant events from sabha parva and Nalopakyana sangraha. **CO3:** Recognize the rules of Swara Sandhi, the declensions of Ajantha Shabda, and the structures of Tatpurusha, Karmadharaya, and Dvigu Samasa.

			CO4: Formulate grammatically correct Sanskrit sentences and accurately analyze structural components in classical prose texts.
AECC	AECC-1	गद्य साहित्य एवं आधुनिक कविता तथा विज्ञान और तकनीकी हिन्दी	**CO1:** विद्यार्थी हिंदी एकांकी साहित्य के माध्यम से सामाजिक, नैतिक एवं मानवीय मूल्यों को समझते हुए पात्रों, कथानक तथा संवाद शैली का विश्लेषण करने में सक्षम होंगे। **CO2:** विद्यार्थी आधुनिक हिंदी कविता की भाषा, भाव, शैली एवं काव्य-सौंदर्य का अध्ययन कर कविताओं का भावार्थ तथा आलोचनात्मक विवेचन प्रस्तुत कर सकेंगे। **CO3:** विद्यार्थी निबंध, व्यंग्य एवं कहानी साहित्य के माध्यम से जीवन-दर्शन, सामाजिक यथार्थ तथा मानवीय संवेदनाओं को समझने और अभिव्यक्त करने में सक्षम होंगे। **CO4:** विद्यार्थी विज्ञान एवं तकनीकी क्षेत्रों में हिंदी भाषा के प्रयोग, वैज्ञानिक शब्दावली, सूचना-प्रौद्योगिकी तथा नागरी लिपि की तकनीकी सुविधाओं का ज्ञान प्राप्त कर व्यावहारिक उपयोग में सक्षम होंगे।

Program matrix: Bachelor of Science (Biochemistry, Botany, Microbiology)

II Semester			
Course type	**Course code**	**Course title**	**Course Outcomes**
DSC	DSC-2	Microbial Physiology and Microbial Genetics	**CO1:** Explain microbial nutritional requirements, growth kinetics, cultivation methods, preservation techniques and metabolic pathways, and perform cultivation and growth analysis using standard microbiological techniques. **CO2:** Analyze microbial enzyme activity, physiological responses to environmental factors and energy-generating mechanisms by conducting laboratory experiments and interpreting experimental observations. **CO3:** Describe the organization of genetic material and mechanisms of genetic exchange in microorganisms, and demonstrate basic microbial genetic techniques including transformation, conjugation and mutation studies. **CO4:** Interpret the genetic mechanisms of viruses and fungi, DNA repair processes and transposable elements, and apply microbiological and genetic principles to analyze experimental results and solve biological problems.

DSC	DSC-2	Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany & Anatomy of Angiosperms	**CO1**: Classify and explain the salient features, classification and economic importance of Bryophytes, Pteridophytes and Gymnosperms. **CO2**: Describe and compare the morphology, anatomy and reproductive characteristics of Bryophytes, Pteridophytes, Gymnosperms and fossil plants. **CO3**: Explain the geological time scale, the process of fossilization and identify different types of fossils. **CO4**: Identify, classify and explain different plant tissues and relate their structure to their functions and differentiate the anatomical structures of roots, stems and leaves of dicotyledonous and monocotyledonous plants.
DSC	DSC-2	Biomolecules	**CO1:** Identify the major classes of biomolecules **CO2:** Describe their characteristic structural features. **CO3:** Explain the chemical properties of each major biomolecule class and relate these properties to their biological functions and significance. **CO4:** Understand and analyze the principles of reactions of different biomolecules, and apply qualitative analytical techniques to identify the presence of specific biomolecules in mixture solutions.
Indian Constitution			**CO1**: Understand the evolution, making, features and core values of the Indian Constitution. **CO2:** Analyze Fundamental Rights, Duties, DPSP and provisions relating to equality and social justice. **CO3:** Analyze the structure, powers and functions of the Legislature, Executive and Judiciary. **CO4:** Evaluate the role of constitutional institutions in upholding democracy and constitutional values.
AECC	AECC-2	Symphony II	**CO1**: Examine poetic expressions of human emotions and global concerns. **CO2**: Understand the humour, irony, and moral themes in short fiction. **CO3**: Explore philosophical and intellectual insights through essays. **CO4**: Use adjectives, adverbs, conjunctions, and commonly confused words accurately.
AECC	AECC-2	ಬಿ.ಎಸಿ ೇಸ, ಪತ್ರಿಕೆ-೨ ವಿಜ್ಞಾನ ಕನ್ನಡ-೨	**CO1:** ಮಾತೃಭಾಷೆಯ ಮೇಲೆ ಗೌರವ, ಅಭಿಮಾನ ಮೂಡಿಸಲು ಸಹಕಾರಿ. **CO2:** ವೈಜ್ಞಾನಿಕ ಸಂಗತಿಗಳ ಬಗ್ಗೆ ಕನ್ನಡದಲ್ಲಿ ಮಾತನಾಡುವ ಕೌಶಲ್ಯ ವೃದ್ಧಿಸುತ್ತದೆ. **CO3:** ಸುತ್ತಮುತ್ತಲಿನ ವಿದ್ಯಮಾನಗಳನ್ನು ಶಕ್ತವಾಗಿ ವ್ಯಕ್ತಪಡಿಸಲು ಧೈರ್ಯ ತುಂಬುತ್ತದೆ **CO4:** ವೈಜ್ಞಾನಿಕ ವಿಚಾರಗಳನ್ನು ಕನ್ನಡದಲ್ಲಿ ತಿಳಿದುಕೊಳ್ಳುವ ಆಸಕ್ತಿ ಮೂಡಿಸಲು ಪ್ರೇರಣೆ ನೀಡುತ್ತದೆ.

AECC	AECC-2	Valmiki Ramayana (Balakanda Canto 1: 1–50 Shlokas), Selected Subhashitas (1–20), Vyanjana Sandhi, Samasa (Dvandva, Bahuvrihi, Avyayibhava), Bhashantara.	**CO1:** Differentiate between various styles, meters,and genres of poetic texts within classical Sanskrit literature **CO2:** Interpret the cultural values, ideal character attributes, and poetic meter of Sage Valmiki's verses. **CO3:** Translate verses accurately and identify structural differences between Sanskrit and regional languages. **CO4:** Apply grammatical principles to correctly combine the split words, identify compound structures in texts, and translate passages accurately.
AECC	AECC-2	गद्य विधाएँ, कविता साहित्य तथा अनुवाद	**CO1:** विद्यार्थी गद्य साहित्य की प्रमुख विधाओं एवं रचनाकारों के विचारों को समझ सकेंगे। विद्यार्थी सामाजिक एवं सांस्कृतिक मूल्यों से संबंधित गद्य रचनाओं का विश्लेषण कर सकेंगे। **CO2:** विद्यार्थी हिंदी कविता के भाव, भाषा एवं काव्य-सौंदर्य की पहचान कर सकेंगे। विद्यार्थी कविताओं में निहित राष्ट्रीयता, प्रकृति एवं मानवीय संवेदनाओं को स्पष्ट कर सकेंगे। **CO3**: विद्यार्थी एकांकी साहित्य की विशेषताओं एवं नाटकीय तत्वों को समझ सकेंगे। विद्यार्थी एकांकी के माध्यम से मानवीय संबंधों एवं सामाजिक समस्याओं का विवेचन कर सकेंगे। **CO4:** विद्यार्थी अनुवाद के अर्थ, स्वरूप एवं उपयोगिता का ज्ञान प्राप्त करेंगे। विद्यार्थी अंग्रेज़ी से हिंदी में सरल एवं प्रभावी अनुवाद करने में सक्षम होंगे।

Program matrix: Bachelor of Science (Biochemistry, Botany, Microbiology)

III Semester			
Course type	**Course code**	**Course title**	**Course Outcomes**
DSC		Molecular Biology and Environmental Microbiology	**CO1:** Explain and interpret the molecular basis of heredity, DNA replication, transcription, translation and mechanisms regulating gene expression in prokaryotes **CO2**: Demonstrate understanding of molecular biology techniques and relate the structure and function of nucleic acids and proteins to cellular activities and perform laboratory

			techniques related to molecular biology techniques including DNA isolation and bacterial DNA recombination. **CO3:** Analyze the diversity and ecological significance of microorganisms present in air, soil and water, including their interactions and environmental applications and perform laboratory techniques related environmental microbiology, including water analysis and biochemical characterization of microorganisms. **CO4**: Apply microbiological methods for assessment of water quality, wastewater treatment, biodegradation and composting processes relevant to environmental sustainability and public health.
ELE-1		Microbial Quality Control in Industries	**CO1**: Explain biohazards, biosafety practices, biosafety levels, and methods for safe handling and disposal of biohazardous waste in laboratories and industries. **CO2**: Demonstrate knowledge of air microflora, bioaerosols, air sampling methods, and microbial quality analysis relevant to healthcare, food and pharmaceutical industries. **CO3:** Perform microbiological quality analysis of food and water using culture-based, immunological and molecular techniques for detection of microbial contaminants. **CO4**: Apply principles of food safety management systems including GMP, GHP, HACCP, FSSAI, FDA and BIS standards in maintaining industrial quality control and public health safety.
DSC		Reproductive Biology, Plant Ecology, Biodiversity & Conservation	**CO1**: Apply the principles of angiosperm reproduction to explain gametophyte development, fertilization, embryogenesis and seed formation. **CO2:** Analyze the structure and functioning of ecosystems by interpreting interactions between biotic and abiotic components. **CO3:** Evaluate ecological processes, succession, biogeochemical cycles, pollution and plant adaptations to assess ecosystem sustainability.

			CO4: Develop appropriate strategies for biodiversity conservation by evaluating threats, conservation approaches, environmental legislation and the roles of national and international organizations.
DSE		Mushroom culture technology & Biofertilizers	**CO1**: Explain the principles of mushroom cultivation by identifying edible and poisonous mushrooms, cultivation methods, and infrastructure requirements for commericial production. **CO2:** Apply appropriate techiniques for spawn production, substrate/bed preparation, pest and disease management and post- harvest handling to ensure quality mushroom production. **CO3:** Evalute the role, production methods and agricultural applications of biofertilizer microorganisms for sustainable crop productivity. **CO4:** Develop sustainable crop production strategies by integrating mycorrhizal associations, Biofertilizers and organic farming practices to enhance crop growth and yield.
DSC	DSC-3	Bioanalytical Techniques	**CO1:** Demonstrate proficiency in performing key chromatographic, electrophoretic, and isotopic techniques and apply them appropriately to analyze biological samples. **CO2:** Isolate selected biomolecules from biological materials and characterize them using appropriate chemical and instrumental methods. **CO3:** Explain the principles of centrifugation and radioactivity, and apply established safety guidelines for the correct handling and disposal of radioisotopes in biological samples. **CO4:** Apply and analyze analytical techniques in biochemistry through experimental practice, and develop proficiency in handling laboratory instruments while evaluating their applications in research work.
DSE	ELE-1	Cellular Biochemistry	**CO1:** Describe the major organelles and structural features of eukaryotic cells **CO2:** Explain how their organization supports cellular functions. **CO3:** Explain major membrane transport mechanisms, differentiate apoptosis from necrosis **CO4:** Describe the core features of GPCR- and RTK-mediated signalling pathways
DSE	ELE-2	Microbial Biochemistry	**CO1:** Explain the germ theory of disease and Koch's postulates, describe principles of Gram and acid-fast staining, sterilization methods, and microscope types **CO2:** Analyze patterns of microbial growth and the factors influencing them. **CO3:** Identify culture media and isolation techniques, perform serial dilution for microbial enumeration, describe industrial applications of fermentors (e.g., beer, dairy products, penicillin) **CO 4:** Explain principles of food preservation and mechanisms of antibiotic action

AECC	AECC-3	*Romeo and Juliet* and Language Component	**CO1:** Explain the events, characters, and major themes in **Acts I and II** of *Romeo and Juliet*. **CO2:** Analyze the plot development, conflicts, and key themes in **Acts III and IV** of *Romeo and Juliet*. **CO3:** Evaluate the tragic ending and the major themes in **Act V** of *Romeo and Juliet*. **CO4:** Develop language skills through reading comprehension, essay writing, précis writing, and dialogue writing.
AECC	AECC-3	ಬಿ.ಎಸ್‌ಸಿ ಪತ್ರಿಕೆ-೩ ವಿಜ್ಞಾನ ಕನ್ನಡ-೩	**CO1:** ವೈಜ್ಞಾನಿಕ ಲೇಖನಗಳನ್ನು ಬರೆಯಲು ಪ್ರೇರಣೆ ನೀಡುತ್ತದೆ. **CO2:** ವೈಜ್ಞಾನಿಕ ಮನೋಭಾವವನ್ನು ಉತ್ತೇಜಿಸುತ್ತದೆ. **CO3:** ಸುತ್ತಲಿನ ಪರಿಸರದ ವಿವರಗಳನ್ನು ಲೇಖನವಾಗಿಸಲು ಪ್ರೋತ್ಸಾಹ ನೀಡುತ್ತದೆ. **CO4:** ವೈಜ್ಞಾನಿಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ಪ್ರೇರಣೆ ನೀಡುತ್ತದೆ.
AECC	AECC-3	Neelakanta Vijaya Champu (3rd Adhyaya), Alankaras (Upama, Roopaka, Utpreksha, Ananvaya), Prayoga, Bhashantara.	**CO1**: Distinguish the structural characteristics of Champu Kavya from pure prose (Gadya) and pure poetry (Padya). **CO2**: Appreciate the complex structural synthesis and aesthetic richness of mixed prose and verse compositions. **CO3:** key characters, narrative sequences, and contextual vocabulary within the third chapter (3rd Adhyaya) of Neelakanta Vijaya Champu. **CO4:** Identify and distinguish major figures of speech (Alankaras) to critically analyze creative writing formats.
AECC	AECC-3	गद्य विधाएँ, कविता साहित्य तथा अनुवाद	**CO1:** विद्यार्थी गद्य साहित्य की प्रमुख विधाओं एवं रचनाकारों के विचारों को समझ सकेंगे। विद्यार्थी सामाजिक एवं सांस्कृतिक मूल्यों से संबंधित गद्य रचनाओं का विश्लेषण कर सकेंगे। **CO2:** विद्यार्थी हिंदी कविता के भाव, भाषा एवं काव्य-सौंदर्य की पहचान कर सकेंगे। विद्यार्थी कविताओं में निहित राष्ट्रीयता, प्रकृति एवं मानवीय संवेदनाओं को स्पष्ट कर सकेंगे। **CO3**: विद्यार्थी एकांकी साहित्य की विशेषताओं एवं नाटकीय तत्वों को समझ सकेंगे। विद्यार्थी एकांकी के माध्यम से मानवीय संबंधों एवं सामाजिक समस्याओं का विवेचन कर सकेंगे। **CO4**: विद्यार्थी अनुवाद के अर्थ, स्वरूप एवं उपयोगिता का ज्ञान प्राप्त करेंगे। विद्यार्थी अंग्रेज़ी से हिंदी में सरल एवं प्रभावी अनुवाद करने में सक्षम होंगे।

Program matrix: Bachelor of Science (Biochemistry, Botany, Microbiology)

IV Semester			
Course type	**Course code**	**Course title**	**Course Outcomes**
DSC	DSC-4	**DSC–4: Genetic Engineering and Agricultural Microbiology**	**CO1:** Explain the principles, tools and techniques of genetic engineering, including cloning vectors, restriction enzymes and recombinant DNA technology and perform basic laboratory techniques related to genetic engineering, **CO2:** Demonstrate understanding of molecular cloning methods, PCR, DNA sequencing, blotting techniques and applications of recombinant DNA technology in medicine and agriculture. **CO3:** Evaluate the role of microorganisms in sustainable agriculture through biofertilizers, biopesticides, biological control agents and agricultural biotechnology applications and perform experiments related to agricultural microbiology. **CO4:** Analyze plant diseases and plant–microbe interactions with respect to disease development, defense mechanisms, symptoms, epidemiology and management of economically important plant diseases and perform experiments related to plant pathology.
ELE	ELE-2	Plant and Animal Microbiome	**CO1:** Explain the concept, diversity and significance of microbiomes associated with plants, animals and humans. **CO2:** Describe the structure, functions and interactions of plant microbiomes in nutrient uptake, nitrogen fixation, carbon sequestration and plant health improvement. **CO3:** Analyze the diversity and functional role of animal microbiomes, including rumen microbiota, microbiomes of livestock, reptiles, earthworms and honeybees. **CO4:** Evaluate the importance of the human microbiome in health and disease, including dysbiosis, probiotics, gut-brain axis, microbiome-based therapies and the Human Microbiome.
DSC	DSC-4	Plant Physiology & Metabolism, Cell Biology & Molecular Biology	**CO1**: Apply the principles of plant water relations, mineral nutrition, phytohormones and photoperiodism to explain plant growth and physiological responses.

			CO2: Analyze the mechanism of photosynthesis, respiration, nitrogen metabolism and biomolecule metabolism in plants. **CO3:** Analyze the organization and functions of cells, organelles, chromosomes and polyploidy in relation to cellular processes and inheritance. **CO4:** Evaluate the structure and function of nucleic acids, DNA replication, gene expression, protein synthesis and cell division to interpret molecular and cellular processes.
ELE	ELE-4	Medicinal Plants & Herbal Technology	**CO1:** Analyze the history, scope, classification and significance of medicinal plants in traditional and modern health care systems. **CO2:** Apply the principles of pharmacognosy to identify medicinal plants and explain the applications of important herbal drugs. **CO3:** Evalute the active phytochemical constituents of medicinal plants and correlate their therapeutic properties with healthcare applications. **CO4:** Demonstrate the use of analytical and quality evalution techniques for the screening, standardization and authentication of herbal drugs.
DC		Nursery, Gardening & Landscaping	**CO1:** Apply nursery management practices and propagation media techniques for the successful production of healthy planting materials. **CO2:** Demonstrate plant propagation methods and bonsai training techniques using appropriate horticultural practices. **CO3:** Analyze horticultural plant characteristics and select suitable species for different garden types and environmental conditions. **CO4:** Design sustainable landscape plants by integrating garden design principles, CAD tools and eco – friendly landscaping practices.

DSC	DSC-4	Enzymology and Metabolism-1	**CO1:** Classify enzymes according to the IUB system and describe their structural features and catalytic mechanisms. **CO2:** Explain enzyme kinetics and the factors influencing enzyme-catalysed reactions, and determine Km and Vmax using the Lineweaver–Burk plot. **CO3:** Describe the major pathways of carbohydrate metabolism, explain their regulation and energetics, and evaluate their physiological significance in maintaining metabolic homeostasis. **CO4:** Apply and analyze standard laboratory techniques to perform enzyme assays—including amylase, invertase, urease, and acid phosphatase—determine enzyme activity, specific activity, and kinetic parameters such as Km and Vmax from experimental data, and evaluate the effects of pH, temperature, substrate concentration, enzyme concentration, and salt concentration on enzyme activity.
SEC	SEC-1	Nutrition	**CO1:** Apply standard biochemical methods to quantitatively analyze food samples for carbohydrates, proteins, amino acids, lipids, and oils. **CO2:** Analyze the nutritional and quality parameters of food and oil samples by determining Basal Metabolic Rate (BMR), protein content, peroxide value, iodine number, and acid value, and interpret the results. **CO3**: Examine food samples to identify common adulterants using qualitative tests and **CO4:** Evaluate adulterant impact on food quality and safety.
SEC	SEC-2	Plant Biochemistry	**CO1:** Apply qualitative analytical methods to identify starch, pigments, enzymes, and major phytochemicals in plant tissues and extracts. **CO2:** Perform quantitative estimation of phenols, flavonoids, tannins, alkaloids, and saponins using standard biochemical techniques. **CO3:** Analyze plant samples using experimental methods such as iodine staining, paper chromatography, DCPIP reduction, and catalase assay. **CO4:** Interpret experimental results and evaluate biochemical properties using methods like the Folin–Ciocalteu assay and related analytical techniques
AECC	AECC-4	*The Bachelor of Arts* and Language Component	**CO1:** Explain the events, characters, and themes in **Part I** of *The Bachelor of Arts*.

			CO2: Analyze the character development, conflicts, and themes in **Part II** of *The Bachelor of Arts*. **CO3:** Evaluate the resolution, character transformation, and central themes in **Part III** of *The Bachelor of Arts*. **CO4:** Develop effective written communication skills through **emails, job application letters with CV/resume, bank correspondence, and business correspondence**.
AECC	AECC-4	ಬಿಎಸ್‌ಸಿ ಪತ್ರಿಕೆ-೪ ವಿಜ್ಞಾನ ಕನ್ನಡ-೪	**CO1:** ನಾಡಿನ ಪರಂಪರೆ ಮತು ಸಂಸ್ಕೃತಿ ಬಗ್ಗೆ ಗೌರವ ಮೂಡಿಸುತ್ತದೆ. **CO2:** ಸ್ಪರ್ಧಾತ್ಮಕ ಪರೀಕ್ಷೆಗಳನ್ನು ಎದುರಿಸುವ ಕೌಶಲ್ಯವನ್ನು ವೃದ್ಧಿಸುತ್ತದೆ. **CO3:** ಸಾಮಾಜಿಕ ಸಂಗತಿಗಳ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುತ್ತದೆ. **CO4:** ಅಭಿವ್ಯಕ್ತಿಯ ಸ್ವರೂಪವನ್ನು ಸ್ಪಷ್ಟಗೊಳಿಸುತ್ತದೆ.
AECC	AECC-4	Kalidasa's Abhijnana Shakuntalam (Acts 4 to 6), Nataka & Drishya Kavya Itihasa, Kriyapada (Verbs), Prayoga, Bhashantara.	**CO1:** Outline the historical origin, classification, and evolution of Sanskrit drama (Nataka) and theatrical poetry (Drishya Kavya). **CO2:** Analyze the emotional depths, character arcs, and aesthetic design within Kalidasa's masterpiece drama. **CO3:** Master verbal conjugations (Kriyapada) and execute sentence structural conversions accurately. **CO4:** Recall the structural rules of voice/usage (Prayoga), conjugation of verb forms (Kriyapada), and basic principles of translation (Bhashantara).
AECC	AECC-4	हिंदी गद्य एवं पद्य साहित्य तथा जनसंचार माध्यम	**CO1:** कथासाहित्य की समझ और सामाजिक यथार्थ का विश्लेषणI कहानी के कथानक, पात्र, भाषा-शैली और भाव-तत्वों का विश्लेषण कर सकेंगे। सामाजिक अन्याय, मानवीय संवेदना, अपराध-चेतना और नैतिक प्रश्नों की गहन समझ प्राप्त करेंगे। **CO2:** आधुनिक कविता की भाव-भूमि, शैली और विचारधारा को समझनाI समकालीन मुद्दों, संघर्ष, श्रमजीवी जीवन, स्त्री-दृष्टि और सामाजिक सरोकारों पर आधारित कविताओं का विश्लेषण करेंगे। विभिन्न कवियों की भाषा, बिंबों, प्रतीकों और काव्यशैली को समझ सकेंगे। **CO3:** गद्य की विविध विधाओं और उनके सामाजिक-सांस्कृतिक संदर्भों की समझI रेखाचित्र, निबंध और एकांकी की विशेषताएँ, शैली, उद्देश्य और संरचना को समझ सकेंगे। महादेवी वर्मा, नामवर सिंह और सेठ गोविन्द दास की रचनाओं के माध्यम से संवेदना, हास्य-व्यंग्य, सामाजिक चेतना और मानवीय

			संबंधों का विश्लेषण कर पाएँगे। **CO4:** संचार और जनसंचार के सिद्धांतों की मूलभूत समझI संचार की परिभाषा, प्रक्रिया और तत्वों को समझेंगे। जनसंचार माध्यमों का वर्गीकरण, संरचना और कार्यप्रणाली जान पाएँगे। समाज में मीडिया की भूमिका, प्रभाव और महत्व को समझ सकेंगे।

Program matrix: Bachelor of Science (Biochemistry, Botany, Microbiology)

V Semester			
Course type	**Course code**	**Course title**	**Course Outcomes**
DSC	DSC-5	Food Microbiology	**CO1:** Analyze the sources of microbial contamination, factors influencing microbial growth, and the microbiological mechanisms responsible for food spoilage. **CO2:** Identify and differentiate food-borne pathogens, toxins, infections, and intoxications, and apply appropriate microbiological methods for their detection. **CO3:** Evaluate physical and chemical food preservation techniques and recommend appropriate preservation strategies to ensure food quality, safety, and shelf life, while analyzing the microbiological quality of milk through the interpretation of starter cultures, contamination sources, biochemical changes, and standard microbiological quality assessment methods. **CO4:** Evaluate the microbiological principles underlying the production of fermented foods and beverages and assess the significance of probiotics, prebiotics, synbiotics, and nutraceuticals in promoting human health and food quality
DSC	DSC-6	Industrial Microbiology	**CO1:** Analyze the scope and significance of industrial microbiology and identify microorganisms employed in industrial production processes. **CO2:** Analyze the principles of fermentation processes, compare different bioreactor systems, and select suitable fermentor designs for industrial applications. **CO3:** Select and justify appropriate fermentation media components and raw materials for industrial fermentation based on microbial and process requirements.

			CO4: Analyze microbial production processes for commercially important industrial products and evaluate the influence of scale-up strategies, process control parameters, downstream processing methods, and enzyme immobilization techniques on product yield, quality, recovery, and efficient industrial bioprocess operations
DSC	DSC-5	Morphology of angiosperms, Taxonomy, Economic Botany and Ethnobotany	**CO1:** Analyze morphological diversity and diagnostic characteristics of angiosperms and apply taxonomic principles to identify and interpret plant diversity. **CO2:** Apply botanical nomenclature, identification methods and classification systems to analyze and establish taxonomic relationships among angiosperms using scientific evidence. **CO3:** Conduct systematic investigations using herbarium techniques, taxonomic keys, digital resources and appropriate scientific tools to identify, classify and document angiosperms. **CO4:** Evaluate the economic, medicinal and ethnobotanical importance and promote ethical, sustainable utilization, biodiversity conservation and societal well-being.
DSC	DSC-6	Plant Breeding and Phytogeography	**CO1**: Explain the principles, objectives, methods, genetic resources and acclimatization involved in plant breeding for crop improvement. **CO2:** Apply the principles of hybridization, selection, heterosis, mutation breeding, polyploidy and Biotechnology in developing improved crop varieties **CO3:** Analyze and evaluate the achievements of plant breeding, crop improvement programmes and the contributions of major plant breeding institutes in India. **CO4:** Analyze the principles of phytogeography, centres of origin, patterns of plant distribution and the vegetation types of India and Karnataka and interpret their significance in plant conservation and biodiversity management
DC		Nursery, Gardening & Landscaping	**CO1**: Apply nursery management practices and propagation media techniques for the successful production of healthy planting materials.

			CO2: Demonstrate plant propagation methods and bonsai training techniques using appropriate horticultural practices. **CO3:** Analyze horticultural plant characteristics and select suitable species for different garden types and environmental conditions. **CO4:** Design sustainable landscape plants by integrating garden design principles, CAD tools and eco – friendly landscaping practices.
DSC	DSC-5	Metabolism II and Clinical Biochemistry	**CO1:** Explain the fundamental principles of bioenergetics, including energy production, ATP generation, and regulatory mechanisms. **CO2**: Explain the metabolic pathways and regulation of amino acid metabolism. **CO3**: Describe the pathways and regulatory mechanisms involved in lipid metabolism and nucleic acid metabolism. **CO4:** Analyze the biochemical basis, clinical significance, and diagnostic relevance of major metabolic disorders.
DSC	DSC-6	Molecular Biology and Genetic Engineering	**CO1:** Explain the mechanisms of DNA replication, including the roles of key enzymes and regulatory processes **CO2:** Explain the types of mutations and the molecular basis of spontaneous and induced mutations **CO3:** Explain the mechanisms of transcription and translation in prokaryotes, including gene expression and its regulation. **CO4:** Apply the principles and techniques of genetic engineering to analyze recombinant DNA technology, gene cloning, PCR, blotting, sequencing, and DNA fingerprinting in molecular biology.

Program matrix: Bachelor of Science (Biochemistry, Botany, Microbiology)

VI Semester			
Course type	**Course code**	**Course title**	**Course Outcomes**
DSC	DSC-7	Immunology	**CO1:** Analyze the organization and functions of the immune system, including lymphoid organs, immune cells, and antigen-presenting mechanisms in immune responses. **CO2:** Interpret the molecular and cellular mechanisms underlying innate and adaptive immune responses and analyze the immunological significance of complement activation pathways, hypersensitivity reactions, and autoimmune disorders in host defense. **CO3:** Analyze hypersensitivity reactions, complement activation pathways, and autoimmune disorders to evaluate their immunological significance. **CO4:** Evaluate the principles and applications of vaccines in immunoprophylaxis and national immunization programmes, and analyze antigen–antibody interactions by applying immunological techniques, including immunofluorescence, for diagnostic and research applications.
DSC	DSC-8	Medical Microbiology	**CO1:** Analyze the composition and functions of the human microbiome and normal microflora at different body sites, and evaluate their role in host–pathogen interactions, disease transmission, types of infections, carrier-mediated spread, and the maintenance of human health and disease. **CO2:** Identify and analyze the etiology, pathogenesis, clinical manifestations, epidemiology, laboratory diagnosis, prevention, and treatment strategies of major bacterial, viral, protozoan, and fungal diseases. **CO3:** Evaluate the principles of antimicrobial therapy and differentiate the mechanisms of action of antibacterial, antifungal, and antiviral agents for effective disease management. **CO4: Assess** the causes, mechanisms, and public health implications of antimicrobial resistance, including multidrug-resistant (MDR), extensively drug-resistant (XDR), methicillin-resistant *Staphylococcus aureus* (MRSA), and New Delhi metallo-β-lactamase-1 (NDM-1).

DSC	DSC-7	Genetics, Genetic Engineering, Plant Biotechnology and Evolution	**CO1:** Analyze the principles of mendelian genetics and Non- mendalian inheritance and patterns of inheritance to solve genetic problems and predict outcomes in organisms. **CO2:** Apply the principles and techniques of genetic engineering and evaluate their applications, benefits, limitations and biosafety and ethical implications in agriculture and biotechnology. **CO3:** Demonstrate and evaluate plant tissue culture techniques and molecular techniques, analyze experimental outcomes and apply appropriate biotechnological approaches for crop improvement and sustainable agricultural practices. **CO4:** Analyze and evaluate the theories, evidences, mechanism of evolution and speciation using scientific patterns of biological diversity
DSC	DSC-8	Phytochemistry and Herbal Technology	**CO1:** Explain the principles of photochemistry, primary and secondary metabolites, medicinal plants and their standardization. **CO2:** Apply appropriate extraction, isolation and purification methods to obtain phytochemicals from plant materials. **CO3:** Analyze phytochemicals using appropriate chromatographic, spectroscopic and analytical techniques for qualitative and quantative evaluation. **CO4:** Evaluate phytochemical findings and herbal products with respect to medicinal applications, quality, ethical practice and sustainable utilization of plant resources
DC		Nursery, Gardening & Landscaping	**CO1:** Apply nursery management practices and propagation media techniques for the successful production of healthy planting materials. **CO2:** Demonstrate plant propagation methods and bonsai training techniques using appropriate horticultural practices. **CO3:** Analyze horticultural plant characteristics and select suitable species for different garden types and environmental conditions.

			CO4: Design sustainable landscape plants by integrating garden design principles, CAD tools and eco – friendly landscaping practices.
DSC	DSC-7	Human Physiology	**CO1:** Describe the structure of major human organ systems. **CO2**: Explain the functions of major human organ systems. **CO3:** Apply the principles of human physiology to understand homeostatic mechanisms. **CO4:** Explain how homeostatic mechanisms maintain normal body functions under different physiological conditions
DSC	DSC-8	Immunology and Toxicology	**CO1:** Explain the structure and functions of the immune system, including immunoglobulins and antigens. **CO2**: Explain the principles of innate and adaptive immunity and their roles in immune responses. **CO3:** Apply immunological principles to explain techniques, hypersensitivity, vaccines, autoimmunity, and antibody production. **CO4:** Explain the basic principles of toxicology, including toxicokinetics, mechanisms of toxicity, and antidotal therapy.