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, Biotechnology, Microbiology)

I Semester Microbiology			
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	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.
DSC	DSC-1	Biomolecules and Microbiology	**CO1: Describe** the structure, classification, properties and biological functions of carbohydrates, lipids, proteins, nucleic acids, vitamins and minerals.

			CO2: Explain the structural organization and biological significance of major biomolecules and their interactions in living systems. **CO3: Explain** the classification, morphology, physiology, growth and reproduction of major groups of microorganisms and their significance in biotechnology. **CO4: Apply** basic microbiological techniques such as sterilization, staining, microscopy and microbial culturing and analyze the beneficial and harmful roles of microorganisms in health, agriculture, food and the environment.
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, Biotechnology, 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	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.
DSC	DSC-2	Cell Biology and Genetics	**CO1:** Describe the structure, organization and functions of prokaryotic and eukaryotic cells and their cellular organelles. **CO2:** Explain the mechanisms of cell division, cell cycle regulation, cell signalling and cellular communication. **CO3:** Analyze the principles of Mendelian and non-Mendelian inheritance, linkage, crossing over and chromosomal variations. **CO4:** Apply genetic principles to solve basic problems related to inheritance, mutations, genetic disorders and chromosome abnormalities.
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 ಮೂಡಿಸ¬ಲು 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, Biotechnology, Microbiology)

III Semester			
Course type	**Course code**	**Course title**	**Course Outcomes**
DSC	DSC-3	**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.
DSE	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	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
DSC	DSC-3	Enzymology and Cellular Metabolism	**CO1:** Explain the classification, structure, properties, mechanism of action and biological significance of enzymes. **CO2:** Analyze enzyme kinetics, enzyme inhibition and factors affecting enzyme activity using appropriate concepts and equations. **CO3:** Describe the major metabolic pathways involved in carbohydrate, lipid, protein and nucleic acid metabolism. **CO4:** Analyze the regulation, integration and energy-yielding mechanisms of major cellular metabolic pathways.

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, Biotechnology, 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-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	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

DSC	DSC-4	Molecular Biology and Genetic Engineering	**CO1:** Explain the molecular organization of DNA and RNA and the mechanisms of DNA replication, transcription and translation. **CO2:** Analyze the regulation of gene expression, genetic mutations, DNA repair and recombinant DNA processes. **CO3:** Apply molecular biology techniques and genetic engineering tools for DNA isolation, amplification, cloning and analysis. **CO4:** Evaluate the applications of recombinant DNA technology and genetic engineering in healthcare, agriculture, industry and research.
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 ತ ಸಂಸ್ಕೃತಿ ಬಗ್ಗೆ ಗೌರವ ಮೂಡಿಸುತ್ತದೆ. **CO2:** ಸ್ಪರ್ಧಾತ್ಮಕ ಪರೀಕ್ಷೆಗಳನ್ನು ಎದುರಿಸುವ ಕೌಶಲ್ಯವನ್ನು ವೃದ್ಧಿಸುತ್ತದೆ. **CO3:** ಸಾಮಾಜಿಕ ಸಂಗತಿಗಳ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುತ್ತದೆ. **CO4:** ಅಭಿವ್ಯಕ್ತಿಯ ಸ್ವರೂಪವನ್ನು ಸ್ಪಷ್ಟಗೊಳಿಸುತ್ತದೆ.
AECC	AECC-4	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-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, Biotechnology, 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 **i**dentify 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	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.
DSC	DSC-6	Animal and Plant Biotechnology	**CO1:** Describe the principles and techniques of plant tissue culture, micropropagation, callus culture, somatic embryogenesis and plant regeneration. **CO2:** Apply plant biotechnology techniques for crop improvement, production of transgenic plants and conservation of plant genetic resources.*)* **CO3:** Explain the principles of animal cell culture, cell lines, hybridoma technology and assisted reproductive technologies. **CO4:** Evaluate the applications of plant and animal biotechnology in agriculture, medicine, industry and research, considering ethical and biosafety aspects.
DSC	DSC-6	Immunology and Medical Biotechnology	**CO1:** Explain the components and mechanisms of innate and adaptive immune responses, including the roles of antibodies, immune cells and complement. **CO2:** Analyze antigen–antibody interactions, hypersensitivity, autoimmunity, immunodeficiency and transplantation-related immune responses. **CO3:** Apply immunological principles and techniques such as ELISA, immunoassays and related diagnostic methods in medical biotechnology. **CO4:** Evaluate the applications of biotechnology in disease diagnosis, vaccine development, therapeutic products and personalized medicine.

Program matrix: Bachelor of Science (Biochemistry, Biotechnology, 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	Human Physiology	**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-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.
DSC	DSC-7	Microbial and Agricultural Biotechnology	**CO1:** Explain the principles and applications of microbial biotechnology in agriculture, including biofertilizers, biopesticides and plant growth-promoting microorganisms. **CO2:** Apply microbial techniques for the production and utilization of biofertilizers, biopesticides, composting agents and other agricultural products. **CO3:** Analyze the role of microorganisms in soil fertility, nutrient cycling, plant growth and sustainable agricultural practices.

			CO4: Evaluate the applications of microbial and agricultural biotechnology for crop improvement, disease management, sustainable agriculture and environmental protection.
DSC	DSC-8	Environmental Biotechnology	**CO1:** Explain the principles of environmental biotechnology and the role of microorganisms in the degradation and transformation of environmental pollutants. **CO2:** Apply biotechnological approaches for the treatment of wastewater, solid waste, industrial effluents and other environmental pollutants. **CO3:** Analyze the microbial processes involved in bioremediation, biodegradation, composting, biogas production and other waste-management practices. **CO4:** Evaluate the potential of environmental biotechnology in pollution control, resource recovery, sustainable development and conservation of natural resources.