B.Sc. in Computer Science
PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life-professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development atlocal/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently(oral and written)as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME OUTCOMES (PSO) After successful completion of a Bachelor's degree in Computer Science, the students will be able to:		
PSO-1	Conduct Investigations of Complex Problems	Analyze a Software problem, design, implement a solution and evaluate the proposed solution to ensure that it meets customer needs and Software standard.
PSO-2	Modern Tool Usage	Use and Apply appropriate current technologies, techniques and modern tools necessary for computing practice.
PSO-3	Project Management	Embark on an Entrepreneurial venture or be eligible for employment in IT industry or pursue higher education.

PSO-4	Problem Analysis	Apply the concept of networking and security features in designing the systems.

Course Outcomes:

S. No.	Course Code	Course Title	Course Outcomes
1.	COM-I.C-1	Mathematical Foundation of Computer Science I	CO1:Apply counting principles to determine probabilities. CO2: Demonstrate an understanding of relations and functions and determine their properties. CO3: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. CO4:Write an argument using logical notation and determine if the argument is valid or not. CO5: Construct and analyze finite state automata.
2.	COM-I.C-2	Introduction to Programming	CO1: Develop solutions to problems that are new to them, and implement these solutions efficiently. CO2: Apply mathematics and logic to solve computing problems. CO3: Develop Computer based Problem Solving Skills. CO4: Recognize and incorporate programming elements such as loops, decision making, functions, arrays, string, structures, pointers and files into applications that solve real world problems.Develop programming skills.
3.	COM-II.C-3A	Data Base Management Systems -I	CO1: Gaina broad understanding of database concepts and the need for the same. CO2:Identify different entities and relationship between them. CO3:Represent the given system diagrammatically using ER diagram. CO4:Convert an ER diagram to a schema and effectively represent it using appropriate RDBMS. CO5:Formulate queries in Relational Algebra, SQL to manipulate the

			database. CO6:Analyze the schema to see if they fulfill Normalization criterion.
4.	COM-II.C-4	Data Structures	CO1: Define relevant standard algorithms for various data structures. Learn various applications of data structures. CO2: Implementation of data structures. CO3: Use various data structures for sorting and searching. CO4: Use various data structures for sorting and searching. CO5: Formulate new solutions for programming problems.
5.	COM-III.C-5A	Object Oriented Programming	CO1: Apply fundamental object-oriented concepts in problem solving. CO2: Analyze problem scenario and identify classes/objects, their properties/functionalities and associations. CO3: Analyze the problem scenario and model the system using UML diagrams. CO4: Implement the object oriented model in any object oriented language.
6.	COM-III.E-I	Software Engineering	CO1: Have an ability to understand and identify various software testing problems and solve them. CO2: Appreciate the role of Software Engineering in the Software development industry. CO3: Demonstrate analytical design and implementation skills required in the process of Software project management. CO4: Apply UML tools and strategies in Software development. Identify risks and suggest ways for risk mitigation. Evaluate the quality of design and code.
7.	COM-III. E-2	Digital Logic Design	CO1: Convert values between decimal, binary, hexadecimal, andoctal number systems. CO2: Develop the minimized logic expression for a digital system using

			Boolean algebra. CO3: Implement combinational circuits using simple gates, complex gates, or universal gates. CO4: Simplify the logic function and create the digital logic circuit. CO5: Design the sequential logic circuit. CO6:Design efficient digital logic circuit for a particular application.
8.	COM-III.E-3	Mathematical Foundation of Computer Science - II	CO1: Describe the following concepts: Graph theory and Numerical analysis. CO2: Apply the Interpolation methods for solving the problems numerically. CO3: Demonstrate the process of curve fitting of data. CO4: Determine the roots of polynomial equations. CO5: Construct and solve real-world problems using graphs and trees.
9.	COM-III.E-4	Web Designing	CO1: Identify the UI design principles. CO2: Classify GUI design patterns. CO3: Design a website structure using HTML (including HTML5). CO4: Apply the style sheets to the website, using CSS (including CSS3). CO5: Implement the dynamic features to the website and validate the forms using Javascript. CO6: Apply JQuery methods to realize feature rich interactive website. CO7: Design a full-fledged website using all the above technologies.
10.	Com-IV. C-6	Computer Architecture and Organization	CO1: Identify various components of the Computer System. CO2: Explain the detailed function of a typical microprocessor and its control unit. CO3: Develop 8086 processor's Assembly Language Program for simple mathematical problems. CO4: Differentiate the function and role of semiconductor memories and map the cache memory for the given scenario. CO5: Appraise the importance of input/output modules and Interrupts

			and their functions. CO6: Distinguish the characteristics and function of I/O interfaces to computer system. CO7: Illustrate the function of pipelined architecture and classify the Multiprocessor systems.
11.	COM-IV.E-5	Design and Analysis of Algorithms	CO1: Explain basic concepts related to the design and analysis of algorithms. CO2: Describe classical algorithms and their complexity. CO3: Design and analyze selected algorithms.
12.	COM-IV.E-10	Mobile Application Development	CO1: Explain mobile devices, including their capabilities and limitations. CO2: Review current mobile platforms and their architectures. CO3: Develop mobile applications on a popular mobile platform. CO4: Evaluate development with another mobile platform.
13.	COM-IV.E-7	Server Side Programming	CO1: Get hands-on programming experience using open -source software, PHP and MySQL to build professional-quality, database-driven websites. CO2: Develop the skills to build interactive web sites with authentication and security by integrating PHP with HTML and CSS. CO3: Learn how to apply basic and advanced object-oriented programming techniques, use libraries, frameworks and advanced database connectivity techniques, and integrate PHP with other web technologies to build secure e-commerce applications. CO4: Customize an application to meet the specific needs of a client use case as would be done in a real-world application.
14.	COM-IV.E-8	Human Computer Interface	CO1: Understand the intricacies of human interaction with a computer System.

			CO2: Appreciate the principles of good screen design and layouts. CO3: Understand the different navigation schemes on windows based interface; learn the different types of selection devices and components of a window based interface. CO4: Analyze Requirements of system. Classify human users based on their abilities, personalities. CO5: Design prototypes. Evaluate the design of user interfaces. Compare the interfaces different products.
15.	COM-V.C-7	Operating Systems	CO1: Understand the fundamental functions of an operating system. CO2: Gain knowledge of Process, process coordination, Process synchronization. CO3: Understand the concept of memory management and virtual memory. CO4: Implement CPU scheduling, memory allocation algorithms. CO5: Gain knowledge of storage devices.
16.	COM-V.E-9	Embedded Systems	CO1: Describe Embedded Systems and its characteristics. CO2: Classify the Embedded processors and their design metrics. CO3: Summarize the performance of ARM processors and various components of Embedded Systems. CO4: Classify Sensors and Actuators, identify their functions and applications. CO5: Categorize I/O devices, I/O Interfacing and Communication protocols along with their functions. CO6: Generalize the functionality of IoT and RTOS. CO7: Design and develop Embedded / IoT Applications using Arduino/Raspberry Pi boards.
17.	COM-V.E-6	Data Base Management System - II	CO1: Formulate complex queries for database updation. CO2: Implement stored procedures and Functions. CO3: Understand concurrent transactions and Recovery mechanisms. CO4: Develop a full database

			application. CO5: Differentiate between SQL and NOSQL databases. CO6: Use given NOSQL database. (As covered in the Practical)
18.	COM-V.E-11	Introduction to Data Science	CO1: Describe what Data Science is and the skill sets needed to be a data scientist. CO2:Explain in basic terms what Statistical Inference means. Identify probability distributionscommonly used as foundations for statistical modeling. Fit a model to data. CO3:Use R to carry out basic statistical modeling and analysis.
19.	COM-V.E-12	Software Testing	CO1: Understand testing of web applications and automated testing tools. CO2: Apply modern software testing processes in relation to software development and project management. CO3: Create test strategies and plans, design test cases, prioritize and execute them. CO4: Develop an ability to understand and identify various software testing problems and solve them.
20.	COM-VI. C-8	Computer Networks	CO1: Know the working of reference model of communication to provide end to end services for the various applications. CO2: Analyze the various behaviors of network protocols using the networking tools. CO3: Use IP addressing and apply routing algorithms to find the routes for packet delivery. CO4: Design the basic computer network and maintain the network. CO5: Describe the working of Data link layer, transport layer.
21.	COM-VI. E-13	Network Security	CO1: Gain Knowledge of the threats, vulnerabilities and system risks. CO2: Understand cryptography, ciphers and encryption algorithms. CO3: Compare and contrast symmetric

			and asymmetric encryption systems. CO4: Know about viruses, Trojan horses, worms, program flaws and the defenses against them.
22.	COM-VI. E-14	Cloud Computing	CO1: Explain the core concepts of the cloud computing paradigm. CO2: Characterize the different cloud services ie. Infrastructure, Platform and Software as a Service (IaaS, PaaS, SaaS).
23.	COM-VI. E-15	Multimedia Techniques	CO1: Understand the concept of Multimedia – Team members and their roles. CO2: Identify and describe the function of the general skill sets in the multimedia industry. CO3: Classify and realize the types of Authoring tools and their functions. CO4: Identify basic components of a multimedia project. CO5: Analyze the requirements of Multimedia product. CO6:Assemble and deliver multimedia projects
24.	COM-VI.E-16	Digital Marketing	CO1: Optimize the website for various search engines. CO2: Market the company/product using Search Engine and Social Media. CO3: Analyze the Web for improving the marketing strategy.

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in Biochemistry, the students will:		
PSO-1	**Fundamental Knowledge of Biochemistry**	Possess a fundamental knowledge of the different aspects of Biochemistry, with the means and ability to specialize in a specific field.
PSO-2	**Development of practical skills**	Be equipped with practical skills and the ability to apply their theoretical concepts to design, perform experiments, analyze and interpret data and thus develop proficiency in laboratory management.
PSO-3	**Critical**	Be able to demonstrate proficiency in quantitative reasoning

	thinking and analytical skills	(critical thinking) and analytical skills.
PSO-4	**Analysis and Problem Solving**	Be able to use these skills to analyze and solve industry-related problems, thus preparing them for a successful career in industry and research institutes.
PSO-5	**Understanding the need for sustainable solutions**	Be able to understand the impact of Biochemistry in the development of sustainable solutions for the environment and societal context.
PSO-6	**Developing an inclination towards research**	Develop an inclination towards research through the compulsory internship in industry/research/academic institutes which promote and inculcate professional ethics and code of practice among students, enabling them to work in a team with a multidisciplinary approach.

COURSE OUTCOMES

S. No.	Course Code	Course Title	Course Outcomes
1	BCH-I.C-1	Molecules of Life	On the successful completion of the course, the students will be able to: **CO1:** Gain an understanding of the various theories of the origin of life **CO2:** Comprehend the importance of water in the sustenance of life. **CO3:** Compare and contrast the various different biomolecules (carbohydrates, proteins, lipids, nucleic acids, vitamins), their categories as well as functions. **CO4:** Understand and apply general laboratory safety measures as well as calculate for preparation of various chemicals for experiments. **CO5:** Prepare different solutions such as buffers, reagents and stock solutions for experiments independently.
2	BCH-I.C-2	Cell Biology	On the successful completion of the course, the students will be able to: **CO1:** Demonstrate an understanding of cell communication **CO2:** Correlate the function of each cell organelle with proper coordination. **CO3:** Identify and analyze different biological cells using a compound microscope **CO4:** Prepare various plant and animal specimen for the observation of cell structures.
3	BCH-II.C-3	Protein Chemistry	On the successful completion of the course, the students will be able to: **CO1:** Comprehend the various levels of protein structure **CO2:** Explain the mechanism and significance of membrane proteins. **CO3:** Correlate the techniques used in studying protein structure **CO4:** Review enzymes and their classification system.

			CO5: Assess and compare the various methods employed in protein estimation/concentration and measuring the protein content.
4	BCH-II.C-4	Biophysics	On the successful completion of the course, the students will be able to: **CO1:** Explain the basic concepts of the origin and evolution of life **CO2:** Understand how cellular reactions take place in accordance with thermodynamic principles **CO3:** Describe the mechanism of derivation of energy through bioenergetic reactions in living cells **CO4:** Elucidate energy transductions in organisms. **CO5:** Understand the concepts of buffer capacity and osmolarity. **CO6:** Demonstrate a practical understanding of spectrophotometry.

Post Graduate Diploma in Computer Application
PROGRAMME OUTCOMES

After successful completion of a Post Graduate Diploma inComputer Application, the students will:

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes
PO-1	Problem Analysis and Solutions	Acquire problem-solving skills, especially the ability to analyze, design andimplement solutions.
PO-2	Modern Tool Usage	Demonstrate technical skills to be employed in a competitive Position inthe IT field related sectors.
PO-3	Project Management	Start an Entrepreneurial venture.
PO-4	Use of Technology	Work in different fields like content development, Multimedia, Website designing, Networking, Banking industry, Academics etc.
PO-5	Life Skills	Recognize the need for, and have the preparation and ability to pursue higher education and engage in independent life-long learning .

Course Outcomes:

S. No.	Course Code	Course Title	Course Outcomes
1.	DCA11	Object Oriented Programming	CO1: Apply fundamental object-oriented concepts in problem solving. CO2: Analyze problem scenario and identify classes/objects, their properties/functionalities and associations. CO3: Analyze the problem scenario and model the system using UML diagrams. CO4: Implement the object oriented model in any object oriented language.
2.	DCA12	Data Base Management Systems	CO1: Gain a broad understanding of database concepts and the need for the same. CO2: Identify different entities and relationship between them. CO3: Represent the given system diagrammatically using ER diagram. CO4: Convert an ER diagram to a schema and effectively represent it using appropriate RDBMS. CO5: Formulate queries in Relational Algebra, SQL to manipulate the database. CO6:Analyze the schema to see if they fulfill normalization criterion.
3.	DCA13	Client Side Technologies	CO1: Use fundamental skills to develop a website. Select and apply markup languages for processing, identifying, and presenting of information in web pages. Use scripting languages and web services to transfer data and add interactive components to web pages. CO2: Incorporate formal concepts of layout and organization to design websites that effectively communicate using visual elements. CO3: Combine multiple web technologies to create advanced web components. CO4: Design websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations. CO5: Incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek. CO6: Conceptualize and develop a mini project for a website with appropriate business models and web technologies.
4.	DCA21	Computer Networks	CO1: Understand the working of reference model of communication to provide end to end services for the various applications. CO2: Differentiate between various types of transmission media. CO3: Understand different layers, protocols and their functioning.

			CO4: Configure a network by assigning IP address. CO5: Analyze the working of different protocols at Network, Transport and Application Layer.
5.	DCA22	Software Engineering	CO1: Understand testing of web applications and automated testing tools. CO2: Apply modern software testing processes in relation to software development and project management. CO3: Create test strategies and plans, design test cases, prioritize and execute them. CO4: Develop an ability to understand and identify various software testing problems and solve them.
6.	DCA-EL1	Multimedia	CO1: Understand the concept of Multimedia – Team members and their roles. CO2: Identify and describe the function of the general skill sets in the multimedia industry. CO3: Classify and realize the types of Authoring tools and their functions. CO4: Identify basic components of a multimedia project. CO5: Analyze the requirements of Multimedia product. CO6: Assemble and deliver multimedia projects.
7.	DCA-EL2	E-Learning	CO1: Develop instructional design skills with E-learning project. CO2: Design and develop quality E-content. CO3: Create, build and upload course material using an appropriate LMS. CO4: Recommend the use of appropriate E-learning strategies to an E-learning course. CO5: Apply and evaluate appropriate assessment Rubrics to the E-content.
8.	DCA-EL3	Python Programming	CO1: Students will learn Python programming, and apply it in data analysis and visualization.
9.	DCA-EL4	Human Computer Interface	CO1: Understand the intricacies of human interaction with a computer System. CO2: Understand the principles of good screen design and layouts. CO3:Understand the different navigation schemes on windows based interface; learn the different types of selection devices and components of a window based interface. CO4: Analyze Requirements of system. CO5: Classify human users based on their abilities, personalities. CO6: Designing prototypes. Evaluate the design of user interfaces. Compare the interfaces different products.
10.	DCA-EL5	E-Commerce	CO1:Understand various E-Commerce Strategies. CO2: Understand the Working of an E-

			Commerce Website. CO3 : Evaluate the various Payment Mechanisms. CO3: Develop an E-Commerce Website.
11.	DCA-EL6	Digital Marketing	CO1: Optimize the website for various search engines. CO2: Market the company/product using Search Engine and Social Media. CO3: Analyze the Web for improving the marketing strategy.
12.	DCA-EL7	Network Administration	CO1: Understand the basic working of reference model of communication to provide end to end services for the various applications CO2: Analyze the various behavior of network protocols using the networking tools. CO3: Understand the basics of IP. CO4: Design the basic computer network and maintain the network CO5: Create and manage users and groups. CO6: Configure routers and basic network application
13.	DCA-EL8	Software Testing	CO1: Understand testing of web applications and automated testing tools. CO2: Apply modern software testing processes in relation to software development and project management. CO3: Create test strategies and plans, design test cases, prioritize and execute them. CO4: Develop an ability to understand and identify various software testing problems and solve them.
14.	DCA-EL9	Server Side Programming	CO1: Get hands-on programming experience using open -source software, PHP and MySQL to build professional-quality, database-driven websites. CO2: Develop the skills to build interactive web sites with authentication and security by integrating PHP with HTML and CSS. CO3: Apply basic and advanced object-oriented programming techniques, use libraries, frameworks and advanced database connectivity techniques, and integrate PHP with other web technologies to build secure e-commerce applications. CO4: Customize an application to meet the specific needs of a client use case as would be done in a real-world application.
15.	DCA-EL10	Data Structures	CO1: Define relevant standard algorithms for various data structures. CO2: Learn various applications of data structures. CO3: Implementation of data structures. CO4: Use of various data structures for sorting and searching.

			CO5: Analyze and compare algorithms for efficiency using Big-O notation. CO6: Formulate new solutions for programming problems.
16.	DCA-EL11	Accounting and Financial Management	CO1: Develop the skills of accountancy and book keeping with the help of software. CO2: Prepare budget and business plan for the firms.
17.	DCA-EL12	Mobile Application Development	CO1: Explain mobile devices, including their capabilities and limitations. CO2: Review current mobile platforms and their architectures. CO3: Develop mobile applications on a popular mobile platform. CO4: Evaluate development with another mobile platform.
18.	DCA-EL13	Office Automation Tools	CO1: Understand basic Spreadsheet features. CO2: Work with different worksheets. CO3: Analyze the data using various graphs. CO3: Analyze data using various spreadsheet features such as lookup tables, Pivot tables, and other statistical features. CO4: Use different features of DTP software. CO5: Develop a desktop Publishing Application using given software.

B.Sc. in Biotechnology

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in Biotechnology, the students will:		
PSO-1	**Fundamental Knowledge of Biotechnology**	Possess a fundamental knowledge of the different aspects of Biotechnology, with the means and ability to specialize in a particular field.
PSO-2	**Development of practical skills**	Be equipped with practical skills and the ability to apply their theoretical concepts to design, perform experiments, analyze and interpret data and thus develop proficiency in laboratory management.

PSO-3	**Critical thinking and analytical skills**	Be able to demonstrate proficiency in quantitative reasoning (critical thinking) and analytical skills.
PSO-4	**Analysis and Problem Solving**	Be able to use these skills to analyze and solve industry related problems, thus preparing them for a successful career in industry and research institutes.
PSO-5	**Understanding the need for sustainable solutions**	Be able to understand the need and impact of biotechnological solutions on environment and societal context, keeping in view the need for sustainable solutions.
PSO-6	**Developing an inclination towards research**	Develop an inclination towards research through the compulsory internship in industry/research/academic institutes which promote and inculcate professional ethics and code of practice among students, enabling them to work in a team with a multidisciplinary approach.

COURSE OUTCOMES

S. No.	Course Code	Course Title	Course Outcomes
1	BIO-I.C-1	Biomolecules	On the successful completion of the course, the students will be able to: **CO1:** Discuss the structure of atoms, biomolecules and chemical bonds. **CO2:** Understand concepts of enzyme kinetics, bio polymers and metabolic reactions in a living system. **CO3:** Understand and apply general laboratory safety measures as well as calculate for preparation of various chemicals for experiments. **CO4:** Prepare different solutions such as buffers, reagents and stock solutions for experiments independently. **CO5:** Operate various lab instruments such as weighing balance, water bath and spectrophotometer.
2	BIO-I.C-2	Cell Biology	On the successful completion of the course, the students will be able to: **CO1:** Correlate the function of each cell organelle with proper coordination. **CO2:** Demonstrate an understanding of cell communication.. **CO3:** Prepare various plant and animal specimen for observation of cell structures **CO4:** Identify and analyze different biological cells using a compound microscope.
3	BIO-II.C-3	Fundamental Genetics	On the successful completion of the course, the students will be able to: **CO1:** Outline the basic principles of Mendelian genetics and compare and analyze different inheritance patterns as well as solve problems based on genetic principles.

			CO2: Compare and contrast different mutations, their effects on cells and the application of the same to research. **CO3:** Differentiate between the structure and working of a compound and dissection microscope. **CO4**: Construct and interpret a karyotype prepared from a spread of metaphase chromosomes.
4	BIO-II.C-4	Basic Microbiology	On the successful completion of the course, the students will be able to: **CO1:** Understand the scope and importance of Microbiology, classification schemes, cultivation, preservation and maintenance of the microbial cultures. **CO2:** Discriminate between various groups of microorganisms and also comprehend the beneficial and harmful effects of each group of microorganisms. **CO3:** Compare, analyze and apply concepts of the principle and working of various types of microscopes. **CO4:** Adhere to strict laboratory safety measures to be followed in a microbiology laboratory. **CO5:** Master skills in aseptic techniques as well comprehend the importance of cleaning and decontamination.

M.Sc. in Information Technology
PROGRAMME OUTCOMES

After successful completion of M.Sc. in Information Technology, the students will:

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes
PO-1	Conduct Investigations of Complex Problems	Develop deep theoretical and practical knowledge of important disciplines of Information Technology like Data Structures, Database Management Systems, Operating Systems and Networks, Design and Analysis of Algorithms, Software Architecture, Data Mining and Information Retrieval.
PO-2	Problem Analysis and Solutions	Imbibe the skill of writing optimal software programs independent of any particular programming language and platform so as to make the student self-reliant to learn and work in any programming language, tool or platform.
PO-3	Use of Technology	Inculcate Soft Skills and Mathematical skills in the student that are required in IT sector.
PO-4	Research Aptitude	Develop the ability of conducting research independently.
PO-5	Communication	Develop the skill of working in teams.
PO-6	Project Management	Acquire an edge of having real-world experience by virtue of the internship in Software Industry/Research Organization being a mandatory part of the programme.

Course Outcomes:

S. No.	Course Code	Course Title	Course Outcomes
1.	MIT 11	Data Structures and Algorithms	CO1: Have an idea of applications of algorithms in a variety of areas such as game theory etc. CO2: Make foundation of writing programs using algorithms on trees, graphs etc. CO3: Design and analyze the time and space efficiency of the data structure. CO4: Identify the appropriate data structure for given problem.
2.	MIT 12	Operating Systems and Networks	CO1: Analyze the structure of Operating system. CO2: Analyze various Resource management and fault tolerance techniques for real time systems. CO3: Discuss the fundamentals of IP addressing. CO4: Apply subnet masking concepts to allocate space for host in subnet. CO5: Examine techniques to protect the network.
3.	MIT 21	Software Architecture, Design Patterns and Frameworks	CO1: Examine the various concepts of Object-Oriented Analysis and Design. CO2: Study Creational, Structural and Behavioral Design Patterns. CO3: Analyze a given problem and study the applicability of Design Patterns to the problem. CO4: Understand Software architecture and Frameworks. CO5: Understand Anti Patterns and steps that should not be taken while developing software.

4.	MIT 22	Design and Analysis of Algorithms	CO1: Analyze the running time of various Algorithms. CO2: Apply the algorithms and techniques to solve various problems. CO3: Analyze the complexities of various problems in different domains. CO4: Design their own algorithmic strategies to Solve problem and analyze their correctness.
5.	MIT 23	Advanced Database Management Systems	CO1: Critically evaluate alternative designs and architectures for Databases and Data Warehouses. CO2: Discuss and evaluate methods of storing, managing and interrogating complex data. CO3: Analyze the background processes involved in queries and transactions, and explain how this impact on Database operation and design. CO4: Develop a high-level understanding of major DBMS components and their function.
6.	MIT31	Data Mining	CO1: Understand the evolution of Data Mining and Data Warehousing. CO2: Study various Association Rules Mining Algorithms. CO3: Study Decision Trees, Bayesian Classification, Artificial Neural Networks, Fuzzy Set Theory and Genetic Algorithms. CO4: Apply various types of Clustering Algorithms, Web Mining Techniques and techniques of mining complex types of data.
7.	MIT 32	Information Retrieval	CO1: Develop system for IR using various models. CO2: Perform Query evaluation and Relevance feedback. CO3: Design systems that include hyperlinks, multimedia and the web. CO4: Understand

			XML, Parallel, Distributed and Multimedia IR.
8.	Elective	Software Metrics & Project Management	CO1: Understand the various types of management namely scope, time, cost, quality, human resource, communication, risk, procurement and integration management. CO2: Understand software metrics and quality standards. CO3: Plan a metrics measurement programme. CO4: Enforce Quality standards in projects
9.	Elective	Mobile Computing	CO1: Apply data communicating methods and networking protocols for wireless and mobile environments. CO2: Understand positioning techniques and location based services and applications. CO3: Utilize and employ application frameworks for developing mobile applications. CO4: Use java for wireless devices and understand wireless messaging.
10.	Elective	Compiler Design	CO1: Understand the different phases of a compiler. CO2: Use tools such as Lexand YACC etc. CO3: Apply the concepts of Register allocation. CO4: Design and code a compiler for a programming language.
11.	Elective	Computer Graphics	CO1: Describe the purpose of Computer Graphics and its applications. CO2: Describe and implement methods for performing 2-Dimentional geometric transformations. CO3: Describe the concept of 3-Dimentional Graphics and methods for performing 3-Dimensional geometric transformations. CO4: Discuss basic illumination models and surface rendering algorithms.

			CO5: Develop familiarity with key algorithms for modelling and rendering graphical data. CO6: Gain experience in constructing interactive computer graphics programs like Babylon JS.
12.	Elective	Natural Language Processing	CO1: Compose key NLP elements to develop higher level processing chains. CO2: Assess / Evaluate NLP based systems. CO3: Choose appropriate solutions for solving typical NLP subproblems (tokenizing, tagging, parsing). CO4: Perform Lexical and Semantic Analysis.
13.	Elective	Image Processing	CO1: Understand how digital images are represented and manipulated in a computer, including reading and writing from storage, and display. CO2: Analyze and implement image processing algorithms. CO3: Perform Image Compression. CO4: Apply Morphological Image Processing.
14.	Elective	Middleware Technology	CO1: Understand the distributed systems, asynchronous communication and event-based systems in detail. CO2: Gain knowledge of Servlet technology and Enterprise Java beans. CO3: Understand web services and reflective middleware. CO4: Apply concepts that are learnt while working in live projects that involve Web Component and Business Component Programming.
15.	Elective	Software Testing	CO1: Revise fundamentals of testing and learn about Functional testing and Object Oriented testing methods. CO2: Gain knowledge of test case design, execution and report. CO3: Understand testing of web

			applications and automated testing tools. CO4: Apply knowledge of Software Testing in the industry.
16.	Elective	Cloud Computing	CO1: Understand cloud infrastructure model and cloud deployment model. CO2: Gain knowledge about the underlying principles of cloud virtualization. CO3: Explore different cloud programming platforms and tools. CO4: Develop and deploy applications by utilizing cloud platforms.
17.	Elective	Network Security	CO1: Understand fundamentals of Cryptography and security. CO2: Gain knowledge about Block and Stream Ciphers, public key cryptography and asymmetric algorithms. CO3: Acquire knowledge about authentication and web security protocols. CO4: Implement Cryptographic Algorithms in a programming language.
18.	Elective	Communication Skills Course	CO1: Apply creative thinking abilities necessary for effective communication at a modern workplace. CO2: Demonstrate clarity, precision, conciseness and coherence in the use of language. CO3: Learn to make one's writing better, fasterand more successful. CO4: Produce successful documents in any given situation in different formats, while considering the writer's objectives, the reader's needs, the reader-writer relationship and the context. CO5: Increase personal confidence in delivering speeches to small & large audiences. CO6: Understand and gain non-

			verbal skills essential to effective speaking. CO7: Make proper presentations that disseminate information, conduct negotiations and use persuasion.
19.	Elective	Applied Probability and Statistics	CO1: Gain knowledge about the probability theory. CO2: Solve problems containing Discrete and Continuous Random variables. CO3: Apply the concepts of Statistical Inference to Mathematical problems. CO4: Provide statistical quality control.
20.	Elective	Machine Learning	CO1: Understand the fundamentals of machine learning. CO2: Understand the techniques for supervised learning and unsupervised learning. CO3: Recognize various ways of selecting suitable model parameters for different machine learning techniques. CO4: Perform experiments in Machine Learning using real-world data.
21.	Elective	Statistical Computing	CO1: Gain knowledge of various types of Plots and Charts. CO2: Use various types of distributions and statistical tests for solving problems. CO3: Configure software environment to develop programs to implement statistical concepts. CO4: Use a tool to apply the

			theoretical concepts to practical problems.
22.	Elective	Educational Technology	CO1: Define educational technology and identify its role in teaching. CO2: Determine the technology requirements and describe the teaching challenges and opportunities associated with integrating technology in the classroom. CO3: Inculcate capability of carrying out research in the Educational Technology domain. CO4: Master usage of ICT tools.

Parvatibai Chowgule College (Autonomous)

Margao, Goa

Programme Outcome (PO) and Course Outcome (CO)

Name of the Department: **Botany**

Programme Outcomes:

PO1: Recognize all forms of plant groups (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms) and infer/ predict their Phylogenetic linkages. Illustrate distinct features.

PO2: Recognize cell organelles and bio molecules including enzymes, Predict and interpret their significances in cell metabolism/functioning and Pathways.

PO3: Apply physiological mechanism of plants to analyze synthesis of valuable plant products (Primary/ Secondary) with economic potential and health effects through the field of Horticulture.

PO4: Analyze the techniques and working principles of Instruments used in Botanical studies and apply the knowledge in Basic and applied Plant research (Microbiology, Plant Physiology, plant breeding, Fungi, Plant Tissue Culture, Plant Genetic Engineering, Ecology, plant drug technology. etc.) through bio statistical parameters.

PO5: Analyze applications of online biological database, data handling in plant drug discovery and interactions.

PO6: Appraise the students knowledge in Botany including fundamental basis of all living organisms (Plant and Microbes) and applying the same in sustainable usage of resources for the quality human survival on planet earth.

Sr. No.	Course Code	Course Title	Course Outcomes
1.	**BOT-I.C-1**	Plant diversity	**CO1:** Recognise and understand the evolutionary aspects of different plant groups of lower plants. **CO2:** classify lower plants. **CO3:** describe the lower plant groups. **CO4:** sketch the morphology and anatomy of selected lower plants.
2.	**BOT-I.C-2**	Cell Biology & Biomolecules	**CO1:** Recognise, classify cell, explain cell theory, evolution and biogenesis **CO2:** Define, describe, classify and explain cytoskeleton, cell organelle, biomolecules **CO3:** Define, describe, compare, explain, illustrate cell wall and plasma membrane **CO4:** Predict and interpret the importance of cell organelles and biomolecules in cell functioning
3.	**BOT-II.C-3**	Plant Anatomy and Embryology	**CO1:** Define, describe and explain the basic plant anatomical and embryological features **CO2:** Compare the interrelatedness of organ-systems

			and their functions **CO3:** Examine the features through histological techniques. **CO4:** Define, describe, explain, compare theories in organization of tissues
4.	**BOT-II. C-4**	Microbiology	**CO1:** appraise the student knowledge to fundamental basis of all living microbes and their interaction with the environment. **CO2:** Apply the knowledge of microbial world towards the sustainable usage of resources for the quality human survival on the planet Earth.
5.	**BOT-III.C-5**	Physiology of Plants	**CO1:** Analyse Physiological processes in plants. **CO2:** Formulate and design experiments to analyse and interpret data. **CO3:** Learn to describe the processes through practicals and mini projects. **CO4:** Estimate and evaluate methods of quantitation of pigments, enzymes and metabolites.
6.	**BOT-IV.C-6**	Cytogenetics	**CO1:** To restate fundamentals of genetics **CO2:** To identify different stages of cell division. **CO3:** To construct chromosome maps. **CO4:** To review the effects of mutagens on seed germination.
7.	**BOT-V.C-7**	Plant Molecular Biology	**CO1:** Outline, memorize and express process of central dogma **CO2:** Estimate and evaluate methods of quantitation of macromolecules **CO3:** Understand molecular basis of life **CO4:** Learn and demonstrate basic molecular technique of DNA isolation and separation through electrophoresis.
8.	**BOT-VI.C-8**	Genetic Engineering	**CO1:** Apply the basic knowledge of Plant Genetic Engineering in research **CO2:** Perform experiments by themselves **CO3:** Compare and assess the different DNA sequencing techniques **CO4:** Design experiments in plant genetics
9.	**BOT- III.E-1**	Ecology & Conservation	**CO1:** To discuss role and importance of biotic and abiotic environment factors in the sustenance of plant life **CO2:** To analyze the pollution scenario of the area. **CO3:** To estimate the oxygen and Carbon dioxide from different water samples. **CO4:** To evaluate and determine minimum area of sampling unit (using quadrat) for the study of local vegetation.

10.	**BOT-III.E-2**	Techniques and Instrumentation in Botany	**CO1:** Learn the Principle and working of techniques and instruments used in Botanical research **CO2:** Analyze the research problem and formulate the methodology for carrying out research/experiment **CO3:** Examine various parameters before setting up an experiment **CO4:** Apply the knowledge in further studies and research in Botany
11.	**BOT-III.E-3**	Enzymes and metabolic pathways	**CO1:** To identify the role of enzymes in various biological processes **CO2:** To classify the different enzymes based on its structure **CO3:** To restate the various mechanisms of enzyme action
12.	**BOT-III.E-4**	Herbal Cosmetology	-
13.	**BOT-IV.E-5**	Plant Breeding and Biostatistics	**CO1:** To recognise various techniques in plant breeding **CO2:** To differentiate between modes of plant breeding **CO3:** To employ manual emasculation procedure. **CO4:** To calculate mean, median, mode, standard deviation, std. error for provided material.
14.	**BOT-IV.E-6**	Systematics of Flowering plants and Phylogeny	**CO1:** Name, arrange, describe and compare the taxa **CO2:** Outline keys for identification of flowering plants **CO3:** Interpret phylogenetic trees, cladograms, etc.
15.	**BOT-IV.E-7**	Plant pathology	**CO1:** Identify various diseases and causal agents of economically important plants **CO2:** Find effective control measures
16.	**BOT- IV.E-8**	Horticulture, Floriculture & Landscaping	**CO1:** Explain the basics of Horticulture, floriculture and landscaping **CO2:** Outline the requirements for building up nurseries, garden, etc. **CO3:** Inculcate the technique of vegetative propagation of plants. **CO4:** Identify and relate the scope of these fields in building up career
17.	**BOT-V.E-9**	Bioinformatics	**CO1:** Explain basics of bioinformatics, biological databases **CO2:** Compare and contrast protein information resources and genome information resources **CO3:** Relate the theoretical knowledge with practical sessions. Enable data handling and analysis. **CO4:** Compare the homology between different biological species.

18.	**BOT-V.E-10**	Seed Technology	-
19.	**BOT-V.E-11**	Plant Drug Technology and Pharmacognosy	**CO1:** Explain, discuss and classify medicinal plants, plant drug and technology **CO2:** Explain and illustrate, biosynthetic pathways, bioassays and working of instruments **CO3:** Discuss and compare methods of extraction and analysis of phytochemicals.
20.	**BOT-V.E-12**	Organic Farming	**CO1:** Create awareness of the social, economic and environmental context for current and future organic agriculture production and management **CO2:** Assess the importance of organic foods in todays World. **CO3:** Apply the knowledge in becoming an entrepreneur in Organic Farming.
21.	**BOT-VI.E-13**	Plant tissue culture	**CO1:** Explain and discuss the general theoretical backgrounds and practical techniques **CO2:** Describe, define, explain/ discuss, compare, concept of differentiation and culture types **CO3:** Define, describe, explain/ discuss, techniques in PTC in media preparation, sterilisation, callus culture and organogenesis **CO4:** Describe, explain, discuss applications in forestry, agriculture etc
22.	**BOT-VI.E-14**	Algal Biotechnology	-
23.	**BOT-VI.E-15**	Economic Botany	**CO1:** To identify economically important plants /plant parts **CO2:** To identify valuable plant products of potential market and economic value. **CO3:** To evaluate, describe and create awareness of the uses of natural plant products as alternative to synthetic and chemical products
24.	**BOT-VI.E-16**	Applied Mycology	**CO1:** To explain techniques involved in sampling, culturing and maintaining fungal cultures. **CO2**: To discuss industrial and agricultural applications of fungi.

Instructions to write Programme outcomes and Course outcomes:

Programme Outcomes :

1. It is expected that each department puts 6 Programme Outcomes (PO).

2. Programme Outcomes will highlight knowledge and skills that the students will acquire during 3/2/1 (Undergraduate, Postgraduate, Diploma) in this college.
   For eg. Critical Analysis, Use of technology, Research, Effective Communication, written as well as verbal communication.
3. Programme Outcomes would be sum total of Core Courses, Electives and Compulsory Courses like Academic Writing, Research Writing, Environmental Studies, Interdisciplinary etc.
4. It should be measurable through your teaching methodologies and evaluation methods.

Course Outcomes :

1. There should be minimum 4 Course Outcomes for each course.
2. Course outcomes are learning outcomes (as per our structure) that signify skill sets that students are expected to achieve after completion of the course. Usually it focuses on higher order skills (please find attached action verbs for your reference)

Attainment of each course outcomes should lead to attainment of programme outcomes.

B.A. in Economics

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life- professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development at local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in Economics, the students will be able to:		
PSO-1	**Subject knowledge & understanding**	**Upon completion of the program students will be able to have :** Consistent & coherent command of the language of economics with ability to clearly define standard terms & the basic concepts in core papers.
		Upon completion of the program students will be able to : Analyze how economic agents make decisions and make choices & use this understanding to solve problems related to economic decisions.
		Upon completion of the program students will be able to: Articulate features and shortcomings in an economic model or

		in a method of analysis
PSO-2	**Effective communication**	**Upon completion of the program students will be able to:** Communicate effectively economic arguments both to those with disciplinary knowledge and to non experts.
		Upon completion of the program students will be able to : Work cooperatively & demonstrate awareness that economic problem may be amenable to more than one analytical approach.
PSO-3	**Quantitative reasoning skills**	**Upon completion of the program students will be able :** Understand how to use empirical evidence, Evaluate the validity of an economic argument, use statistical results & conduct appropriate statistical analysis of data
PSO-4	**Allied Economics skills**	**Upon completion of the program students will be able to :** Gain knowledge of law, history, statistics, Governance, actuarial, foreign exchange, financial, entrepreneur, data analysis and other areas that concern an economy.
PSO-5	**Computer Skills**	**Upon completion of the program students will be able to:** Access, download, and use electronic databases: like Woolridge; Ramanathan; Greene datasets &Use standard software statistical computational packages;
PSO-6	**Specialized knowledge & applications skills**	**Upon completion of the program students will be able to :** Develop an understanding of the theoretical , analytical and methodological approaches used within the discipline
PSO-7	**Critical thinking skills**	**Upon completion of the program students will be able to :** Apply economic analysis to everyday problems in real world situations; Understand current events & evaluate specific policy proposals; Evaluate the role played by assumptions in arguments that reach different conclusions to specific economic or policy problem.

COURSE OUTCOMES

CORE COURSES			
S. NO.	**COURSE CODE**	**COURSE TITLE**	**Upon completion of the course the students will be able to**
1	**ECO-I.C-1**	**Principles of Economics**	**CO1**: Define basic concepts in Economics. **CO2:** Recognize economic problems that require decision making. **CO3**: Distinguish between concepts related to national income **CO**4: Create & draw hypothetical market demand & supply schedules & curves. **CO5**. Differentiate & calculate different types, degrees of elasticity of demand & supply. **CO6**: Arrange different market structure on the basis of degree of competition. **CO7**: Propose solutions to economic problem
2	**ECO-I.C-2**	**Mathematical Techniques for Economic Analysis**	**CO1**: Identify and use the rules of calculus **CO2**: Interpret graphs and tables **CO3**: Apply mathematical techniques in economics **CO4**: Analyze economic reality in a structured manner **CO5**: Assess economic questions as mathematical problems **CO6**: Design optimal solutions to simple economic problems
3	**ECO-II.C-3**	**Economics of Growth and Development**	**CO1**: Order the theories of growth and development on a timeline. **CO2**: Identify patterns of growth based on classical & neoclassical theories of growth and development. **CO3**: Give examples of economies those have experienced the growth & development in line with theories. **CO4**: Distinguish between economies those have and have not experienced growth & development in line with theories. **CO5**: Compare & contrast various growth & development models as applicable to India. **CO6**: Categorize states of India based on different growth patterns. **CO7**. Design & recommend growth model for India

			& or its states.
4	**ECO-II.C-4**	**Empirical Techniques for Economic Analysis**	**CO 1:** Relate empirical methodology to economic enquiry **CO 2**: Summarise, interpret and graph data appropriately **CO 3**: Apply discrete and continuous probability distributions to various business problems **CO 4**: Analyse statistical data using MS Excel **CO 5**: Validate sampling measures **CO 6**: Develop basic statistical inference using correlation, regression, indices, hypothesis testing, and ANOVA
5	**ECO-III.C-5**	**Microeconomics**	**CO1**: Reproduce consumer & producer behavior theories. **CO2**: Describe different concept of production, costs & revenue. **CO3**: Compute total, average & marginal concepts related to production, cost & revenue. **CO4**: Compare & contrast competitive & non competitive market structures. **CO5**: Categorize normal profit, supernormal profit, loss and shutdown point across different market structures. **CO6**: Assess the given micro economic situation (consumer or producer).
6	**ECO-IV.C- 6**	**Macroeconomics**	**CO1**: Define various key macroeconomic variables; principles & tools; and national income concepts **CO2**: Contrast between the long run & short run macroeconomic behavior; and various macroeconomic frameworks **CO3**: Make use of macroeconomic concepts to develop an understanding of the working of the economy **CO4:** Examine and analyze Keynesian and Monetarist macroeconomic framework **CO5**: Justify the policy measures undertaken in a Keynesian system; especially those influencing consumption and expenditure decisions **CO 6**: Estimate, imagine and elaborate the impact of macroeconomic policies on the state of the economy
7	**ECO-V.C-7**	**Public Economics**	**CO1**: Understand the difference between public finance and Public economics. **CO2**: Appreciate public economics & its rationale. **CO3:** Discuss the nature of public economy, the functioning of markets and determinants of market failure. **CO4:**Evaluate the welfare effect of taxes CO5: Demonstrate the theory of public goods in reality. **CO6**: Analyze and evaluate fiscal operations of the government.

8	**ECO-VI.C-8**	**International Trade and Policy**	**CO1**:Define the conditions under which trade is beneficial for both individual nations and international community and identify gainers and losers from trade **CO**2:Compare and evaluate alternative theories of international trade **CO3**:Apply partial equilibrium and general equilibrium models in analysing trade theories & the economic effects of trade policies **CO4:** Analyse key issues raised under WTO & through regional trading arrangements **CO5**:Evaluate the implications of trade on growth and income distribution under various circumstances **CO6**: Adapt the theory to address the issues on globalization, economic integration, and trade policy

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

On Successful completion of the BSc Chemistry programme, the students will be able to

PSO-1	Acquire the skills in preparation of chemical solutions, inorganic complexes, planning the procedures and performing experiments in the laboratory.
PSO-2	Handle scientific instruments like spectrophotometer, pH meter, Conductometer, Potentiometer, etc.
PSO-3	Develop basic theoretical principles of chemistry and writing skills applicable for higher studies and research
PSO-4	Operate efficiently within a group during their project and assignments and hence develop important skills such as communication, negotiation, influence, advising and interpreting

PSO-5	Appreciate the central role of chemistry in our society by understanding the safe handling of chemicals, environmental issues and key issues faced in energy, health and medicine.
PSO-6	Elucidate various spectra, X Ray Diffractograms, TG-DTA curves and identify surface morphology by SEM/TEM images.

On successful completion of the course, the student will be able to

	Course Code	**Course Title**	**Course Outcomes**
1.	CHE-I.C-1	General Physical and Inorganic Chemistry	**CO1 :** Demonstrate and evaluate the rate and order of a reaction. **CO2 :** Utilize mathematical concepts to solve chemical problems. **CO3 :** Develop expertise in the preparation of chemical solutions based on normality, molarity and molality. **CO4 :** Interpret the PV isotherms of gases and identify the critical temperature. **CO5 :** Delineate atomic structure, periodic table and covalent bonding. **CO6 :** Sketch hybridization and molecular orbital diagrams.
2.	CHE-I.C-2	General Organic and Inorganic Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Name the organic compounds using IUPAC nomenclature. **CO2 :** Identify and classify the different organic reactions. **CO3 :** Apply the theoretical knowledge to synthesize alkanes and alkenes. **CO4 :** Write 3D structures of organic molecules using 2D surface. **CO5 :** Identify the given unknown organic compound by carrying out various chemical tests.
3.	CHE-II.C-3	Concepts in Physical and Analytical Chemistry	On successful completion of the course, the student will be able to: **CO1:** Describe the basic concepts of thermodynamics and its applications. **CO2 :** Interpret the pressure temperature diagrams in unary and binary systems. **CO3 :** Explain the concept of surface tension and viscosity in liquids. **CO4 :** Explain role of analytical chemistry in sciences, calculations based on chemical stoichiometry. **CO5 :** Sketch titration curves and solve numericals. **CO6 :** Explain theory on precipitation and complex formation titrations.

4.	CHE-II.C-4	Concepts in Organic and Inorganic chemistry	On successful completion of the course, the student will be able to: **CO1 :** Categorize the compounds as aromatic, non-aromatic and anti-aromatic. **CO2 :** Apply the theoretical knowledge to write the synthesis of alkynes, alkyl halides, aromatic compounds. **CO3 :** Discuss and describe the steps involved in the mechanism of nitration, sulphonation, halogenation and Friedel Crafts reactions of aromatic compounds. **CO4 :** Explain and outline the different properties of transition elements. **CO5 :** Compare 4d and 5d analogues. **CO6 :** Describe crystalline solids in terms of their structure, ionic radii and coordination. **CO7 :** Interpret crystal structures. **CO8 :** Describe lattice energy, Born-Haber's cycle, Fajan's rule and defects in solids. **CO9 :** Explain trends in periodic properties of d-block elements with respect to their ionic radii, oxidation state, spectral properties, magnetic properties. **CO10 :** Describe crystalline solids in terms of their structure, ionic radii and coordination there by able to interpret crystal structure.
5.	CHE-III.C-5	Comprehensive Chemistry-I (Physical & Inorganic Chemistry)	On successful completion of the course, the student will be able to: **CO1 :** Understand Second and Third law of Thermodynamics **CO2 :**Calculate equilibrium constant and formulate conditions for maximum yield in industrial processes **CO3 :** Explain theory of strong and weak electrolytes. **CO4 :** Explain trends in periodic properties of f-block elements with respect to its size of atoms or ions, reactivity, oxidation state, complex formation, colour, magnetic properties. **CO5 :** Name coordination compounds and to able to draw the structure based on its name. **CO6 :** Describe the shape and structures of coordination complexes based on different coordination numbers. **CO7 :** Explain merits and demerits of different theories of acids and bases and to explain the properties of a solvent that determines their utility.
6.	CHE-IV.C-6	Comprehensive Chemistry-II (Organic & Analytical Chemistry)	On successful completion of the course, the student will be able to: **CO1 :** Identify and classify diverse organic compounds containing C, H and O elements. **CO2 :** Predict the chemical reactivities of several organic compounds containing CHO elements. **CO3 :** Outline the preparations of several compounds belonging to different classes of organic compounds having CHO elements.

			CO4 : Apply the important reactions involved in each class of organic compounds with CHO elements. **CO5 :** Design scheme for an analytical process. **CO6 :** Use proper techniques of sampling of solids, liquids & gases. **CO7 :** Apply statistical treatment to analytical data.
7.	CHE-V.C-7	Advanced Chemistry-I: Physical and Inorganic Chemistry	On successful completion of the course, the student will be able to: **CO1:** Understand the interactions of electromagnetic radiation and matter in IR and Raman spectroscopy and their applications. **CO2 :** Explain applications and harmful effects of nuclear radioisotopes. **CO3 :** Demonstrate a sound knowledge of the photochemistry principles and their application. **CO4 :** Employ the theories that govern metal ligand bonding. **CO5 :** Interpret the types of crystal field splitting and calculate the crystal field stabilization energy. **CO6 :** Discuss the types of d-d transitions and its theory.
8.	CHE-VI.C-8	Advanced Chemistry-II: Organic and Analytical chemistry	On successful completion of the course, the student will be able to: **CO1 :** Assess conditions for obtaining maximum efficiency of extraction. **CO2 :** Classify chromatographic methods. **CO3 :** Apply chromatographic method for separation, qualitative and quantitative estimation. **CO4 :** Predict the stereochemistry of products for various reactions using the mechanisms involved in the course. **CO5 :** Explain the reactivity of organic compounds containing nitro, amino and cyano functional groups. **CO6 :** Name and classify the carbohydrates and analyze its chemical reactivities. **CO7 :** Name and classify the organosulfur and organophosphorous compounds and analyze its chemical reactivities. **CO8 :** Apply the important reactions involved for the synthesis of other similar compounds.
9.	CHE-III.E-1	Name Reactions and Synthetic Methodologies	On successful completion of the course, the student will be able to: **CO1 :** Describe condensation reactions involving nucleophilic addition to carbonyl compounds. **CO2 :** Define and describe various name reactions and rearrangements along with their mechanisms. **CO3 :** Predict the product for various reactions involving these name reactions/rearrangements.

			CO4 : Apply these mechanisms towards the formation of complex molecules. **CO5 :** Discuss and describe the steps involved in the mechanism of Friedel-Crafts reactions, Reimer-Tiemann reaction, Vilsmeier-Haack reaction, Gattermann-Koch reaction and Kolbe-Schmidt reaction. **CO6 :** List the different oxidising and reducing agents. **CO7 :** Apply the theoretical knowledge to identify the reagents used to bring about a particular chemical reaction.
10.	CHE-III.E-3	Surface Chemistry and Catalysis	**Course Objectives:** On successful completion of the course, the student will be able to: **CO1 :** Understand the behavior of solid surfaces. **CO2 :** Differentiate between surface energy and surface tension in case of solids. **CO3 :** Classify and interpret various types of adsorption isotherms. **CO4 :** Estimate surface area of a solid. **CO5 :** Predict the mechanistic behavior of catalytic reactions. **CO6 :** Evaluate conditions under which a catalysed reaction changes rate dependence.
11.	CHE-III.E-4	Bioinorganic Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Elucidate the role of metal ions that are involved in different processes like oxygen transport, electron-transfer reactions etc. in biological systems. **CO2 :** Apply the concepts of coordination chemistry to metallobiomolecules which are based on iron and copper ions. **CO3 :** Evaluate the role of metal centres in the metalloenzymes that are involved in the catalysis of various biological reactions and thus predict the reaction mechanisms. **CO4 :** Develop skills to prepare model systems which mimic the role of metal ions in biological systems. **CO5 :** Discuss the importance of essential and trace elements in biological processes and evaluate their role in biology. **CO6 :** Explain the biologically important compounds like proteins, carbohydrates etc. and to interpret their biological importance. **CO7 :** Compare different mechanisms of ion transport across cell membrane and classify different biomolecules which help in the transport of ions and to illustrate PS-I and PS-II approach of photosynthesis. **CO8 :** Analyze how metals are used as diagnostic agents and application of Au, Cu, Zn, Pt-complexes as anti-cancer drug and in medicine.

12.	CHE-IV.E-5	Pharmaceutical Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Understand the significance of chemistry in Pharmaceutical chemistry. **CO2 :** Develop an understanding of the physico-chemical properties of drugs. **CO3 :** Explain molecular mechanism of drug action and metabolism. **CO4 :** Draw comparison between medicinal chemistry and pharmaceutical chemistry. **CO5 :** Synthesize some of the important drugs reported in literature. **CO6 :** Identify and define the drug classes and some pharmacological properties.
13.	CHE-IV.E-6	Polymer and Colloid Science	On successful completion of the course, the student will be able to: **CO1 :** Distinguish between different types of solutions in terms of solute dimensions. **CO2 :** Evaluate properties of colloids. **CO3 :**.Explain properties of gels and emulsions. **CO4 :** Calculate molecular weight of a polymer. **CO5 :** Design synthesis of a polymer. **CO6 :** Measure molecular weight of a polymer. **CO7 :** Understand solid state properties of polymers.
14.	CHE-IV.E-7	Spectroscopic Techniques	On successful completion of the course, the student will be able to: **CO1 :** Outline and interpret the deviation from Beer-Lambert's Law and to identify the validity and limitations. **CO2:** Interpret the spectroscopic methods for qualitative and quantitative analysis; discuss the principle instrumentation; compare the Colorimeter and Spectrophotometer and employ UV-Visible Spectrophotometer. **CO3:** Outline the principle on which inductively coupled plasma spectroscopy works and illustrate the instrumentation involved in the technique. **CO4:** Employ inductively coupled plasma spectroscopy technique and identify its limitations.
15.	CHE-V.E-9	Heterocyclic Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Identify, name and classify the various heterocyclic compounds. **CO2 :** Describe the structure, different reactions and preparations of selected nitrogen and oxygen containing aliphatic heterocycles. **CO3 :** Describe the structure, diverse reactions and syntheses of pyrrole, furan, thiophene and pyridine heterocycles. **CO4 :** Describe the structure, diverse reactions and synthetic routes with mechanisms of numerous condensed heterocycles. **CO5 :** Predict the reactivities of complex heterocyclic compounds containing the

			structural motif of these simple heterocycles. **CO6 :** Apply the synthetic methodologies for the synthesis of complex heterocycles.
16.	CHE-V.E-10	Nanomaterials and Solid State Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Recall the history, occurrence and technological development of nanomaterials and classify them. **CO2 :** Compare different synthesis techniques of nanoparticles like biological, chemical and physical and design various nanomaterials. **CO3 :** Evaluate XRD data, and calculate its parameters; carry out analysis of TG-DTA curves; assess morphology and particle size from SEM/TEM images. **CO4 :** Express the physical and chemical properties of solids like magnetic, electrical and dielectric and interpret the applications of materials in various field like catalysis, ferrofluids, etc.
17.	CHE-V.E-11	Organometallic Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Illustrate metal-ligand interaction in formation of different metal carbonyls based on valence bond theory. **CO2 :** Explain and rationalize the synthesis, structure, bonding, properties of organometallic compounds of main group elements. **CO3 :** Apply the EAN concept and Wade's rules to any organometallic system and predict its stability, structure and bonding. **CO4 :** Understand the chemical behavior and predict the reaction mechanism of organometallic compounds. **CO5 :** Illustrate the catalytic cycles using an organometallic compound as a catalyst for industrial synthesis of some organic compounds. **CO6 :** Interpret IR spectra of metal carbonyls and predict their structure.
18.	CHE-VI.E-13	Spectroscopic Methods in Organic Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Describe the principles of IR, UV and Mass spectroscopy. **CO2 :** Calculate UV maxima of any given organic compound using Woodward-Fieser rules. **CO3 :** Predict the presence of various functional groups in a given organic compound using IR spectroscopy. **CO4 :** Interpret the mass spectra of various organic compounds. **CO5 :** predict the structures of organic compounds based on the given ^{1}H NMR and ^{13}CMR data. **CO6 :** interpret the ^{1}H NMR and ^{13}CMR spectra

			of organic compounds.
19.	CHE-VI.E-14	Environmental Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Delineate how pollutants are transported and accumulated in the environment. **CO2 :** Recognize different types of toxic substances and analyze toxicology. **CO3 :** Describe water purification and waste treatment processes. **CO4 :** Apply knowledge of chemical and biochemical principles of fundamental environmental processes in air, water, and soil. **CO5 :** Apply basic chemical concepts to analyze chemical processes involved in different environmental problems. **CO6 :** Develop skills in procedures and few instrumental methods applied in analysis of soil and water pollution.
20.	CHE-VI.E-15	Selected Topics in Inorganic Chemistry	On successful completion of the course, the student will be able to: **CO1 :** Differentiate between thermodynamic stability and kinetic stability and apply it to transition metal complexes. **CO2 :** Apply the concepts to determine the reaction mechanism of transition metal complexes. **CO3 :** Determine the factors that govern the stability and lability of transition metal complexes. **CO4 :** Illustrate the chemistry and function of some of the technologically useful materials like liquid crystals, superconductors and fullerides. **CO5 :** Understand the properties and classify the polymers **CO6 :** Explain the preparation, structure and bonding and applications of polymers comprising of B, P, Si and S. **CO7 :** Analyze the magnetic properties of the transition metal complexes as well as interpret the effect of temperature on magnetic properties. **CO8 :** Determine the magnetic susceptibility by using Guoy's balance. **CO9 :** Identify and apply the symmetry elements in molecules and to evaluate the Point groups in molecules with appropriate examples.

B.A. in English
PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and atte686mpt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in English, the students will:		
PSO-1	Core Concepts , evolving forms and traditions in literature	Define, recognize and appreciate major literary forms as well as understand the nature, functions and schools of literary criticism and literary theory; appreciate the impact of the major texts and traditions of literature written in English in their social, cultural and historical context.
PSO-2	Synthetic thinking and analysis of literature & culture	Identify and explain the historical, cultural and literary connections between texts, analyze, interpret and describe the critical ideas, values and themes that appear in literary and cultural texts and understand the way these ideas, values and themes inform and impact culture and society, both now and in the past.
PSO-3	Analytical writing and research	Write analytically in a variety of formats , including essays, research papers, reflective writing and critical reviews of secondary sources.

PSO-4	Ethical synthesis of source	Ethically gather, understand, evaluate and synthesize information from a variety of written and electronic sources
PSO-5	Employable Skills	Apply Skills developed through courses like writing for the media, creative writing and ELLT (creating basic teaching methods in ELLT)
PSO-6	Life Skills	Recognize and analyze various linguistic features of language and practice four linguistic skills.

Course Outcomes:

S. No.	Course Code	Course Title	Course Outcomes
1.	ENG-I.C-1	Understanding Poetry & Drama	CO1: Recognize and define major poetic forms such as lyric poetry, narrative poetry. CO2: Know and identify rhyme, rhythm and meter. CO3: Understand and appreciate the literal and symbolic/inner meaning (connotative and denotative meaning) of a poem. CO4: Identify and analyze special stylistic features of poetry such as imagery, tone, atmosphere, special linguistic and stylistic features, imagery. CO5: Recognize and appreciate various elements of a drama: Plot, Character, Dialogue, Setting, Theme, and Act-Scene Division. CO6: Understand and be knowledgeable about the evolution of two major forms of Drama – Tragedy and Comedy.
2.	ENG-I.C-2	History of English Literature from Fifth Century to the Eighteenth Century	CO1: Identify and perceive the complex relationship between literature and society. CO2: Enable the learner to explain how and why particular types of literature emerged from particular set of historical circumstances. CO3: Critically appreciate representative literary works written in different ages. CO4: Inculcate ability to read independently literary texts of the Renaissance to the 18th Century
3.	ENG-II.C-3	Understanding Fiction	CO1: Recognize and define elements of Short Stories, Novella and Novel such as Plot, Character, Setting, Theme. CO2: Understand the structural difference between a short story and a novel. CO3: Critically analyze short stories and novels. CO4: Understand the inception of the short story, novella and novel.
4.	ENG-II.C-4	An Introduction to Linguistics and Stylistics	CO1: Identify and classify English sounds. CO2: Produce utterances with correct stress and rhythm. CO3: Distinguish between different international varieties of English registers of English. CO4: Analyse stylistic features of literary language. CO5: Ability of analyse English syntax. CO6: Select and use appropriate register of English language. CO7: Ability to write grammatically correct English.
5.	Eng-III.C-5	Contemporary Indian	CO1: Students with literature of

		English Literature	Contemporary Indian English Literature. CO2: Create awareness of the different genres employed by Contemporary Indian English Writers. CO3: Elevate critical reading skill. CO4: Familiarize students with the various themes and narrative techniques of the Contemporary Indian English writers.
6.	ENG-IV.C-6	Literary Criticism	CO1: Understand the nature and functions of literary criticism. CO2: Read the writings of literary scholars and critics with understanding and judicious appreciation. CO3: Recognize and define major critical schools. CO4: Generate and articulate personal responses to literary and critical texts. CO5: Explain the premises and assumptions underlying such personal responses.
7.	ENG-V.C-7	Nineteenth Century English Literature	CO1: Appreciate the socio-economic facets of nineteenth century and its impact on literature written during the time. CO2: Analyze the socio-economic impact on literature written during the time. CO3: Understand and identify the essential features of Romanticism and Victorianism CO4: Critically evaluate the literary texts written during the Nineteenth Century.
8.	ENG-VI.C-8	Twentieth Century English Literature	CO1: Read and appreciate representative literary works of Twentieth Century English Literature. CO2: Identify different modern prose styles as well as colloquial rhythms of modern poetry. CO3: Critically evaluate the impact of World Wars and psychology on Literature. CO4: Appreciate the socio-eco facets of the Twentieth Century.
9.	FC-ENG-I	Effective English Communication	CO1: Speak fluently, confidently and use correct English. CO2: Efficiently draft letters– formal & informal letters, representations, notices, agendas and minutes of meetings. CO3: Communicate effectively through written communication.
10.	ENG-E-1	Goan Literature and Culture	CO1: Sensitized to Goan ethos and culture. CO2: Appreciate the historical, psychological, religious and political realities during the pre-colonial and post colonial period.

			CO3: Identify diverse literary and cultural trends that helped form Goan Literature. CO4: Knowledgeable and enriched about Goan cultural heritage. CO5: Critically analyze the Goan literary texts.
11.	ENG-E-2	American Literature of the Twentieth Century	CO1: Appreciate American culture and literature of the Twentieth Century. CO2: Will be sensitized to American culture and literature during the Twentieth Century. CO3: Identify socio-political issues that took place in America during the Twentieth Century. CO4: Critically analyze the American literary texts of the Twentieth Century.
12.	ENG-III.E-3	Writing for the Media	CO1: Comprehend the importance of good writing in the field of Mass Media - from print to Digital Media. CO2: Understand theoretical perspectives behind mass media and the jargon associated with the field. CO3: Master writing skills required for various media - from journalism in print and broadcast media to advertising and creative commercial media. CO4: Demonstrate competence in the technicalities of clear, concise writing through the use of accurate grammar, punctuation, spellings and writing style.
13.	ENG-E-4	New Literatures in English	CO1: Understand the concept of the marginalized segments in society. CO2: Recognize writers, forms, and movements associated with the marginalized. CO3: Analyze works of literatures critically, keeping in mind the segmented. CO1: Write reflective and research essays to present their responses to New Literatures in English.
14.	ENG-E-5	The Literature of the Indian Diaspora	CO1: Understand Diaspora. CO2: Understand Indian Diaspora through Arts and literature. CO3: Identify and analyze Diaspora themes through short stories and poems.
15.	ENG-E-6	Creative Writing	CO1: Demonstrate an understanding of concepts related to the creative writing genres. CO2: Present their ideas/opinions confidently through creative writing

			genres. CO3: Create a sample of their own creative output (individual/group). CO4: Develop ability to critique and edit their own work as well as others'. CO5: Use ICT & Digital technology in their creative endeavour.
16.	ENG-E-7	Visual Literature	CO1: Understand core concepts in Visual Literature: how to read, and establish it as a literary form. CO2: Recognize writers, forms, and ages associated with graphic novels, comics and other forms of visual literature. CO3: Analyze works of visual literatures critically. CO2: Write reflective and research essays to present their responses to Visual Literature.
17.	ENG-E-8	Representation of Gender and Sexuality in Literature	CO1: Appreciate the fluid nature of gender and sexuality. CO2: Recognize the literal/ symbolic meanings depicted in literature related to gender and sexuality. CO3: Decipher the interplay between gender and sexuality as seen through depictions, imagery and so on. CO4: Recognize various themes seen in literature pertaining to gender and sexuality.
18.	ENG-E-9	Shakespeare Today	CO1: Understand the various themes presented in the works of Shakespeare. CO2: Appreciate Shakespeare's works and its relevance in today's era. CO3: Identify the various genres that Shakespeare's plays have been adapted into. CO4: Compare and contrast Shakespeare's plays and the adapted versions.
19.	ENG-E-10	Ancient Indian Classics in Translation	CO1: Perceive aesthetic and philosophical, social aspects of ancient Indian society and their reflection in literature. CO2: Analyze and appreciate various literary features in ancient Indian classics CO3: Comprehend Indian poetics. CO4: Make a comparative study of Indian poetics and Western
20.	ENG-E-11	Film Studies	CO1: Understand the literature of Films through relevant exemplars. CO2: Recognize Directors, artists, genres, and movements in Films.

			CO3: Identify genres in films, and critically analyze films. CO4: Write, direct and shoot their own short film, informed by Film theory and Film literature.
21.	ENG-E-12	Women's Writing in India	CO1: Appreciate woman's point of view regarding life. CO2: Understand the life of a woman in patriarchal society of India. CO3: Understand distinct features of women's writing.
22.	ENG-E-13	English Language and Literature Teaching	CO1: Understand and recognize fundamental concepts, methods, and approaches related to ELLT. CO2: Create basic modules using theories in ELLT CO3: Teach using methods, and approaches in ELLT. CO3: Write reflective, analytical and research action essays to present their responses to ELLT.
23.	ENG-E-14	Latin American Literature	CO1: Understand the large landscape of Latin American Literature. CO2: Recognize writers, forms, and movements associated with Latin American Literature. CO3: Write reflective and research essays to present their responses to Latin American Literature. CO4: Analyze works of literatures critically, keeping in mind the context of Latin America.
24.	ENG-E-15	Contemporary Literary Theory	CO1: Make a comparative study of the different schools of literary theory. CO2: Comprehend the basic tenets of modern literary theory and the jargon associated with it. CO3: Apply literary theory and critically appreciate works of literature.
25.	ENG-E-16	World Literature	CO1: Understand and have an insight into the diverse representative works in World Literature. CO2: Analyze literature critically, keeping in mind the cultural diversity. CO3: Identify the various themes and narrative techniques of World Literature. CO4: Critically analyze significant texts from the World Literature canon. CO5: Appreciate canonical works of World Literature

PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE
AUTONOMOUS
DEPARTMENT OF COMPUTER SCIENCE

PART B: Resolutions/Recommendations of BoS that require consideration / approval of Academic Council:

1. Approved syllabi of Semester V and Semester VI of Bachelor of Vocational Software Development for academic year 2019-20 is presented in **Annexure-I.**

2. Review of Structure of F.Y.BVoc (Software Development) is presented in **Annexure-II**.

3. Updated Syllabi of Data Structure and Office Automation Tools is presented in **Annexure-IIIA**.

4. Program Specific Outcomes and Course Outcomes for B.Voc (Software Development) is presented in **Annexure-IV**.

5. BoS members felt that, online courses like Swayam can be offered to students under course Independent study.

6. Scheme of examination for B.Voc (Software Development) will be same as the scheme of examination of B.A and B.Sc in Parvatibai Chowgule college.

7. BoS members felt that under extension and academic activities, schools and higher secondary schools can be adopted and even sessions can be delivered to the school children.

8. Under Any other Business

a. BoS members discussed about considering B.Voc(Software Development) as one of the eligibility criteria for M.Sc-IT admission. Eligibility criteria is presented in **Annexure-V.**

b. Approved syllabi of three Skill Enhancement courses for B.Sc Computer Science is presented in **Annexure-VI**.

c. BOS also approved the Panel of Examiners for Computer Science. Same is presented in **Annexure -VII**.

ANENXURE IV

Parvatibai Chowgule College of Arts and Science (Autonomous)

DEPARTMENT OF COMPUTER SCIENCE

B.Voc(Software Development)

Program Specific Outcomes and Course Outcomes

B.Voc Software Development
PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life-professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development at local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in Vocation Software Development, the students will:		
PSO-1	Conduct Investigations of Complex Problems	Able to apply theoritical and practical knowledge to solve real world problems.

PSO-2	Sef Directed	Work ready at each exit point of the program.
PSO-3	Project Management	Able to work in teams and acquire an edge of having real world experience by virtue of internship which being mandatory part of the programme.
PSO-4	Problem Analysis	Able to imbibe the skill of writing optimal software programs.

Course Outcomes(Skill Component)

Sr.No	Course Code	Course Title	Course Outcome
1	CSD-SK1	Computer Organization and Operating System	CO1: Understand the Von Neumann architecture. CO2: To have a thorough understanding of the basic structure and operation of a digital computer. CO3: Understand the function of an operating system.
2	CSD-SK2	Web Designing	CO1: Apply markup language for presenting of information in web pages. CO2: Able to design responsive websites CO3: Implement different frameworks used for web designing
3	CSD-SK3	Introduction to Programming	CO1: Explain computer programming concepts CO2: Able to design algorithmic solution to a problem CO3: Covert algorithms to python programs CO4: Design program with interactive input and output
4	CSD-SK4	Database Management Systems	CO1: Able to model an application's data requirements using conceptual modeling tools like ER

			diagrams. CO2: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. CO3: Use a database management system to create, populate, maintain, and query a database.
5	CSD-SK5	Network Administration	CO1: Apply basic networking concepts to setup, maintain and troubleshoot web servers. CO2: Understand user management and roles in database CO3 : Demonstrate expertise in configuring host and network level technical security controls to include host firewalls, user access controls, host logging, network filtering, intrusion detection and prevention and encryption
6	CSD-SK6	Multimedia	CO1: Develop specific skills in designing Graphical Images, Audio and Video Capture and Editing using Software tools CO2: Understand the industrial standard of video, audio and image formats. CO3: Understand were and when to use image manipulation software tools. .
7	CSD-SK7	Object Oriented Paradigm	CO1 : Apply fundamental object-oriented concepts in problem solving. CO2: Analyze problem scenario and identify classes/objects, their properties/functionalities and associations.

			CO3 : Analyze the problem scenario and model the system using UML diagrams. CO4 : Implement the object oriented model in any object oriented language.
8	CSD-SK8	Computer Network	CO1: Gain Knowledge of the Reference models CO2: Understand basic concepts of data transmission medium, Compare various routing, CO3: Able to design the basic Computer network and maintain the networks CO4: Develop client server program for different applications
9	CSD-SK9	Server Side Programming	CO1: Able to write basic server-side scripts CO2: Demonstrate the techniques and features of server side programming and database techniques to construct a web application. CO3: Recognize security issues in web development and suggest and implement best practice solution.
10	CSD-SK10	Web Development Framework	CO1: Understand the enabling technologies for building Internet an Web database applications. CO2: Understand the different components for developing client/server applications. CO3: Apply the techniques and features of the client/server development languages to construct database application based on the Internet. CO4: Develop the web database applications through programming exercises.
11	CSD-SK11	Agile Software	CO1: Plan and deliver an effective software engineering process, based

		Engineering	knowledge of widely used development lifecycle models. CO2: Develop Team working skills including general organization, planning and time management, and inter-group negotiation. CO3: Develop pair programming, ur testing, and refactoring skills. CO4: Apply agile practices such as test-driven development, standup meetings, and pair programming to their software engineering practices
12	CSD-SK12	Mobile Application Development	CO1: Apply Java programming concepts to Android application development. CO2: Design and develop user Interfaces for the Android platform. CO3: Ability to apply general programming knowledge in the field of developing mobile applications
13	CSD-SK13	Data Structure	CO1: Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include arrays, linked lists, binary trees, heaps, and hash tables. CO2: knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching and sorting of each data structure. CO3: Analysing and compare algorithms for efficiency using Big-O notation. CO4: Implementing projects requiring the implementation of the above data structures.
14	CSD-SK14	Software Testing	CO1: Understand Software Testing process of an applications. CO2: Apply modern Software Testing process in relation to

			Software Development and Project Management. CO3: Create Test Strategies and plans, design test cases, prioritize and execute them. CO4: Have an ability to identify and understand various Software Testing problems and solve them.
15	CSD-SK15	Design and Analysis of Algorithms	CO1: To explain basic concepts related to the design and analysis of algorithms. CO2: To describe classical algorithms and their complexity CO3: To design and analyse selected algorithms.
16	CSD-SK16	Cloud Computing	CO1: Explain the core concepts of the cloud computing paradigm. CO2: Characterize the different cloud services ie. Infrastructure, Platform and Software as a Service (IaaS, PaaS, SaaS).

Course Outcomes(General Component)

S. No.	Course Code	Course Title	Course Outcomes
1	CSD-GE3	Cyber Security	CO1: Understand the working of a computer network. CO2: Be aware of the various measures that need to be taken in order to protect data. CO3: Able to understand various forms of crimes in cyber world.

			CO4: Gain knowledge about various rights given to the individual to protect their intellectual property.
2	CSD-GE4	Office Automation Tools	CO1: Examine spreadsheet concepts and explore the Microsoft Office Excel environment. CO2: Learn to use functions and formulas. CO3: Work with pivot tables and charts.
2	CSD-GE5	Mathematical Foundation of Computer Science I	CO1: Apply counting principles to determine Probabilities. CO2: Demonstrate an understanding of relations and functions and determine their properties. CO3: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. CO4: Write an argument using logical notation and determine if the argument is valid or not.
3	CSD-GE9	Business Communication	CO1: Using persuasive and professional language in speech and writing CO2:Conducting effective business research and communicating the process and findings in a range of business documents and oral presentations CO3: Planning and managing a business project and communications strategy CO4:Demonstrating advanced interpersonal communication, business etiquette and relationship building skills
4	CSD-GE13	Personality Enhancement	CO1: To improve soft skills, communicate effectively & grow as a professional. CO2: Develop your overall personality and gain confidence in your daily encounters and present yourself assertively.

5	CSD-GE14	Digital Marketing	CO1: Optimize the website for various search engines. CO2: Market the company/product using Search Engine and Social Media. CO3: Analyze the Web for improving the marketing strategy.
6	CSD-GE15	Organizational Behavior	CO1: Organizational Behavior Fundamental Concepts. CO2: Learn how to deal with work stress in an organization. CO3: Learning how to lead a team.
7	CSD-GE17	E-Commerce	CO1 : Understand various E-Commerce Strategies. CO2 : Understand the Working of an E-Commerce Website. CO3 : Evaluate the various Payment Mechanisms. CO4 : Develop an E-Commerce Website.
8	CSD-GE19	Human Computer Interface	CO1 : Understand the intricacies of human interaction with a computer System. CO2 : Understand the principles of good screen design and layouts. CO3 : Understand the different navigation schemes on windows based interface; learn the different types of selection devices and components of a window based interface. CO4 : Analyze Requirements of system. CO5 : Classify human users based on their abilities, personalities. CO6: Designing prototypes. Evaluate the design of user interfaces. Compare the interfaces different products.

B.Sc. in Geology
PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life-professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development at local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.

PROGRAMME SPECIFIC OUTCOMES (PSO)
After successful completion of a Bachelor's degree in Geology, the students will be able to :

PSO-1	Explain the theoretical concepts involved in courses like Mineralogy, Petrology and Structural Geology.
PSO-2	Apply theoretical concepts involved in mineral forming to confidently identify them in hand as well as in thin sections.
PSO-3	Analyse the theoretical concepts and apply them in interpreting the various petrographic features in rocks exhibited in hand specimens and in thin sections.
PSO-4	Create, analyse and interpret structural geological maps.
PSO-5	Make accurate field observations during field excursions and relate their understanding of various structural and petrological features learnt in classroom for correct interpretation.
PSO-6	Communicate confidently and write geological reports.
PSO-7	Demonstrate content knowledge appropriate to professional career goals

COURSE OUTCOMES: Upon completion of the course, the student will be able to :

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-I.C.1	Fundamentals of Mineralogy	**CO1** Understand what is a mineral and its formation. **CO2** Explain mineralogical properties like polymorphism, isomorphism, Pseudomorphism. **CO3** Describe the physical properties of minerals. **CO4** Relate crystal chemistry and chemical bonding to the formation of minerals like crystal structure, chemistry, chemical composition. **CO5** Compare and contrast the elemental and major oxide composition of the crust with the entire earth. **CO6** Link how the internal atomic structure of minerals affects the external development of a crystal in terms of crystal symmetry, crystal system and crystal forms. **CO7** Identify rock- forming minerals in hand specimen using their physical properties. **CO8** Classify minerals into crystal systems based on crystal symmetry.
GEL-II.C-2A	Earth's Dynamics and Tectonics	**CO1** Understand the origin and nature of the earth and its layered structure. **CO2** Gain insights into the spheres of the earth and their inter-relationship, the earth's Gravity, and magnetic field. **CO3** Relate the concept of Isostacy with plate tectonics **CO4** Differentiate between the different types of forces acting in the lithosphere and link the different types of responses of brittle and ductile substances to stress. **CO5** Understand the exogenous and endogenous geological hazards. **CO6** Read and interpret geological maps and draw geological cross – sections. **CO7** Recognize different types of folds, faults and joints.
GEL-I.C-3A	Elementary Petrology	**CO1** Understand the processes involved in the formation of rocks, their textures and structures. **CO2** **C**lassify rocks into their various types – Igneous, Sedimentary or Metamorphic. **CO3** Understand the importance of rocks. **CO4** Differentiate between the different rock types based on their textures, structures and mineralogy **CO5** Identify the different textures and structures of rocks. **CO6** Describe the mineralogy and properties of, and identify common rock types.

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-II.C-4	Principles of Stratigraphy and Paleontology	**CO1** Understand principles of Stratigraphy and concept of Facies. **CO2** Differentiate between absolute and relative age of the earth. **CO3** Explain measurements of geologic time. **CO4** Describe how rocks are correlated. **CO5** Describe types of fossils, conditions and modes for fossilisation, how fossils can be used to locate economic deposits. **CO6** Describe and explain morphology of the hard parts of different phylum's and geological time range. **CO7** Understand map reading and handle clinometer compass. **CO8** Solve problems on bearings. **CO9** Describe and identify fossils/casts/shells w.r.t their morphology and geological age. **CO10** Apply classroom teaching to field observations and preparing a geological report.
GEL-III.C-5A	Advanced Mineralogy and Geochemistry	**CO1** Understand the concept of Gibbs Phase Rule. **CO2** Correlate structure, chemical composition with physical and optical properties of minerals of major silicate group of minerals. **CO3** Interpret stability relations of minerals using Phase diagrams. **CO4** Understand how minerals originate and associate with each other in a rock **CO5** Understand the geochemical composition of the Earth. **CO6** Describe how compatible elements are involved in the various geochemical processes. **CO7** Explain how incompatible elements are involved in the various geochemical processes. **CO8** Evaluate and interpret how geochemistry can be used to interpret tectonic setting. **CO9** Solve applied quantitative problems. **CO10** Plot major oxides in tectonic discriminant diagrams.
GEL-III.E-1	Physical Geology	**CO1** Identify the dominant medium of erosion, transportation and deposition in a given area and explain the mechanisms for those processes. **CO2** Identify various dessert landforms and explain the processes involved in their formation. **CO3** Identify various fluvial landforms and explain the processes involved in their formation. **CO4** Identify various Karst topography and features and explain the processes involved in their formation.

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-III.E-1 (contd.)	Physical Geology (contd.)	**CO5** Identify various glacial and coastal landforms and explain the processes involved in their formation. **CO6** Assign stream order as per Strahler's Method, Analyze various attributes of basin morphometry and drainage. **CO7** Prepare and analyze long and cross sections of river profiles from SOI Toposheet. **CO8** Deduct the processes involved in shaping the geomorphology of a local area by an integrated approach of applying theoretical knowledge and field based observations.
GEL-III.E-2	Groundwater and Hydrogeology	**CO1** Understand the concept of Groundwater, its sub-surface distribution and sources. **CO2** Explain the rock properties of porosity and permeability affecting the movement of groundwater. **CO3** Differentiate between the various types of aquifers. **CO4** Carry out groundwater exploration by resistivity method. **CO5** Draw flow-nets from groundwater levels. **CO6** Determine water quality based on various parameters. **CO7** Understand the effects of over withdrawal of groundwater and water logging, and suggest mitigation measures.
GEL-III.E-3A	Ore Genesis	**CO1** Differentiate between rock-forming minerals and ore minerals. **CO2** Understand the basis of classifying ore minerals. **CO3** Understand the origin and stages of ore formation. **CO4** Classify the various ore minerals under categories such as magmatic, hydrothermal, volcanogenic etc. **CO5** Explain the processes involved in the formation of ore deposits. **CO6** Understand the genesis and occurrence of various ore deposits in India. **CO7** Evaluate ore minerals in hand specimen using their physical properties.
GEL-III.E-4	Marine Geology	**CO1** Understand ocean bathymetry and learn to identify features of the ocean floor such as mid ocean ridges, seamounts, guyots, hydrothermal vents, pillow basalts, trenches. **CO2** Relate the ocean features to its tectonic origin. **CO3** Understand the various processes which generate ocean currents.

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-III.E-4 (contd.)	Marine Geology (contd.)	**CO4** Classify marine sediments into four broad categories based on their origin i.e lithogenous , hydrogeneous, biogenous, cosmogenous. **CO5** Identify the characteristics of important marine resources for the future such as polymetallic nodules and gas hydrates. **CO6** Recognise how near shore geological processes shape coastlines over time.
GEL-IV.C-6	Structural Geology	**CO1** Gather knowledge about the geometry of various structures acquired by rocks at primary and secondary stages. **CO2** Understand the concepts of stress and strain. **CO3** Understand the application of stress and strain in rock deformation. **CO4** Identify rock structures and deformities like joints, folds and faults. **CO5** Understand a structural separation in geological context based on unconformities. **CO6** Identify secondary structures developing in rocks. **CO7** Interpret geological maps **CO8** Solve structural problems based on provided data.
GEL-IV.E-5A	Engineering Geology	**CO1** Understand issues related to geological basement and structure of a region. **CO2** Identify the characteristics of basement rock formations and problems associated with them. **CO3** Describe and interpret geological structures in geological maps and drawing cross sections. **CO4** Assess the area appropriately suggested for a geotechnical project and apply the geological knowledge for a safe and secure construction and operation of a geotechnical project. **CO5** Suggest remedial measures to encounter the problems detected. **CO6** Interpret core logs and suggest suitable remedial measures. **CO7** Collect data interpret and analyse it to solve problems associated with the engineering project as well as the environment. **CO8** Explore and suggest novel ideas using geological background for the geotechnical project. **CO9** Suggest Site feasibility based on geological maps. **CO10** Carry out physical and mineralogical descriptions of cores. **CO11** Draw relationship of core log to RQD values **CO12** Compute reservoir area, catchment area, reservoir capacity. **CO13** Solve numerical problems on ultimate strength of rocks.

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-IV.E-6A	Optical Mineralogy	**CO1** Understand basic concepts in optical mineralogy wrt relief, pleochroism, character between crossed polars, extinction and their types, interference colours, zoning and twinning. **CO2** Correlate elementary principles of optics to crystal optics. **CO3** Distinguish Uniaxial and Biaxial Indicatrix **CO4** Understand the concept of formation of Interference colours and determine their orders as per Newton's Scale. **CO5** Handle Petrological Microscopes. **CO6** Identify major rock-forming minerals in microsections. **CO7** Detect Optic Sign for Uniaxial and Biaxial Minerals using Interference Figures. **CO8** Determine Anorthite content of Plagioclase. **CO9** Calculate Optic Axial Angle.
GEL-IV.E-7	Natural Hazards and Management	**CO1** Understand the causes, effects and mitigation measures for natural hazards such as droughts, floods, cyclones, volcanic eruptions, tsunami, landslides & subsidence, salinity hazards, coastal erosion. **CO2** Appreciate the CRZ act and its impact on disaster mitigation. **CO3** Understand the framework and roles of various bodies under the National disaster management plan of India. **CO4** Prepare a simple disaster management plan for a building/unit.
GEL-IV.E-8	Geotectonics	**CO1** Gain an insight into the study of the earth's interior using seismic data. **CO2** Understand the various layers of the earth's interior and the mechanism of plate tectonics. **CO3** Explain the origin and nature of the earth's magnetic field and palaeomagnetism. **CO4** Understand the theory of Continental Drift along with supporting evidences. **CO5** Explain mountain building (orogenesis) and its relation with plate tectonics. **CO6** Identify and plot various tectonic features on the earth's surface.
GEL-V. C-7A	Sedimentary Petrology	**CO1** Understand the processes leading to the formation of sedimentary rocks. **CO2** Identify and explain the various textures and structures of sedimentary rocks. **CO3** Relate different sedimentary facies with the environment of deposition. **CO4** Describe and identify the textures, structures and mineral composition and origin of various clastic and non-clastic sedimentary rocks.

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-V.E-9B	Precambrian Stratigraphy of India	**CO1** Understand evolution and stabilisation of the Archean cratons in India with special emphasis on Dharwar craton. **CO2** Understand the tectonics behind Mobile Belts of India **CO3** Differentiate between western Dharwar Craton and Eastern Dharwar Craton. **CO4** Interpret geological and geochemical differences of the basement rocks for Sargur (Gorur Gneiss) and Dharwarian (Peninsular Gneissic Complex) **CO5** Relate the lithostratigraphy of Sargur and Dharwar Schist Belt and correlate it with the Goa Group of rocks. **CO6** Understand the Purana basins in India with emphasis on Cuddapah Vindhyans and Kaladgis. **CO7** Identify specimens representing rock Formations in Goa **CO8** Assigning stratigraphy Formations based on fossils. **CO9** Solve problems in stratigraphic correlation
GEL-V.E-10	Petroleum Geology	**CO1** Describe the Physical & chemical properties of Hydrocarbons. **CO2** Compare various exploration techniques involved in hydrocarbon detection. **CO3** Understand the process of drilling & completion of a Petroleum well. **CO4** Prepare isopach maps. **CO5** Delineate and describe the petroliferous domains in India. **CO6** Analyse well logs.
GEL-V. E-11A	Metamorphic Petrology	**CO6** Correlate deformation with grade of metamorphism. **CO7** Evaluate how the different factors like temperature, pressure, protolith, chemically active fluids and time control metamorphism. **CO8** Interpret tectonic setting of Metamorphic Belts based on field characters and kinematic stress indicators. **CO9** Interpret the metamorphic processes combining the evidences derived from hand specimens, microsections and protolith. **CO10** Differentiate between Barrovian and Buchan Zones **CO11** Apply the facies concept to progressive contact and regional including burial metamorphism. **CO12** Identify textures of metamorphic rocks in hand specimens. **CO13** Identify textures, structures, mineralogy of metamorphic rocks in thin sections

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-V.E-12	Remote Sensing and Digital Image Processing	**CO1** Explain remote sensing principles, purposes, advantages and limitations. **CO2** Define and describe electromagnetic spectrum and interactions with various types of media. **CO3** Describe characteristics of remote sensing imagery. **CO4** Describe sensors and image acquisition methods. **CO5** Search and download satellite imagery from online portals such as Bhuvan, USGS Earth explorer. **CO6** Understand the application of digital imagery for interpretation of lithology, Structure and geomorphology. **CO7** Prepare various maps using Quantum GIS and Google Earth.
GEL-VI.C-8A	Igneous Petrology	**CO1** Understand conceptual techniques wrt nucleation and growth of minerals thereby understanding the formation of a rock. **CO2** Identify igneous rocks in hand specimen. **CO3** Identify igneous rocks in thin sections **CO4** Classify igneous rocks **CO5** Evaluate a rock wrt its environment of formation (PT) conditions thereby assign a name. **CO6** Identify key textural and microstructures and their application related to geological processes. **CO7** Interpret ternary phase diagrams. **CO8** Classify rocks based on their chemical analysis.
GEL-VI.E-13B	Phanerozoic Stratigraphy of India	**CO1** Understand the Gondwana sedimentation and its economic significance. **CO2** Understand the geology and geotectonics of Triassic of Spiti. **CO3** Understand the geology and geotectonics of Jurassic of Kutch. **CO4** Understand the geology and geotectonics of Cretaceous of Trichinopoly. **CO5** Understand Deccan Flood Volcanism. **CO6** Analyse and interpret the Gondwana breakup. **CO7** Understand the geology and geotectonics of Tertiaries of Assam and its economic significance **CO8** Understand the upheaval and evolution of Himalayas. **CO9** Relate boundary problems associated with Precambrian-Cambrian, Permian-Triassic, Cretaceous-Tertiary and Pleistocene-Holocene boundaries in India and their relation to mass extinctions. **CO10** Prepare lithostratigraphic maps.

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
GEL-VI.E-14A	Rock Structures and Deformation Microstructures	**CO1** Understand the process and mechanisms of rock structures and rock deformation microstructures. **CO2** Interpret the significance of microstructures in Igneous, Sedimentary and Metamorphic rocks. **CO3** Apply the significance of features like foliation and lineation in field as well as in microsections in understanding microstructures and rock deformation. **CO4** Interpret Shear Sense Indicators in Mylonites. **CO5** Enhance application skills in relating deformation history to tectonism. **CO6** Interpret deformation features in field and in microsections. **CO7** Identify and Interpret the significance of rock structures in thin sections. **CO8** Identify and Interpret the significance of rock deformation microstructures in thin sections.
GEL-VI.E-15A	Surveying, Mapping and Field Geology	**CO1** Carry out dumpy level survey. **CO2** Carry out plane table survey. **CO3** Understand SOI Toposheet catalogue. **CO4** Learn to plan for a geology field trip. **CO5** Record detailed field observations systematically in their field diary and subsequently prepare a geologic field report of the same.
GEL-VI.E-16A	Principles of Geophysical Exploration and Mining	**CO1** Gain knowledge of key concepts of mining processes right from exploration to exploitation **CO2** Understand the difference between the nature of, and factors leading to the choice between, Open-cast and Underground mining methods. **CO3** Explain the different techniques of ore beneficiation. **CO4** Get acquainted with government agencies and regulations that control the mining and mineral conservation processes. **CO5** Explain the principles behind, and methods of Geophysical, Geochemical and Geobotanical exploration. **CO6** Draw cross - and longitudinal sections using bore-hole Data. **CO7** Estimate ore reserves using different methods. **CO8** Get a first-hand experience in core-logging

B.A. in Hindi

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life- professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development at local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO)		
PSO-1	भाषिक क्षमता	भाषा विज्ञान के अध्ययन के परिणामस्वरूप विद्यार्थियों में भाषिक क्षमता का विकास होगा।
PSO-2	साहित्य आस्वादन एवं मूल्यांकन।	साहित्य आस्वादन एवं समीक्षा की परंपरा से अवगत होंगे और साहित्य मूल्यांकन की दृष्टि विकसित होगी।
PSO-3	समीक्षा की भारतीय एवं पाश्चात्य परंपरा तथा विभिन्न आंदोलनों का ज्ञान।	साहित्य समीक्षा की भारतीय एवं पाश्चात्य परंपरा तथा विभिन्न आंदोलनों के आधार पर साहित्य के मूल्यांकन की क्षमता विकसित होगी।
PSO-4	ाटक एवं रंगमंचीय प्रयोगों का ज्ञान।	नाटक एवं रंगमंच से जुड़ी विविध विधाओं एवं रंगमंचीय प्रयोगों से विद्यार्थियों में अधिगम क्षमता का विकास होगा।

PSO-5	मुद्रित एवं इलेक्ट्रोनिक पत्रकारिता का सैद्धांतिक एवं व्यावहारिक अध्ययन।	समाचार-पत्र, रेडियो, दूरदर्शन एवं इंटरनेट पत्रकारिता के सैद्धान्तिक एवं व्यावहारिक अध्ययन से मुद्रित एवं इलेक्ट्रोनिक पत्रकारिता के क्षेत्र में रोजगार के अवसर तलाशने में सक्षम होंगे।
PSO-6	विज्ञापन एवं अनुवाद के क्षेत्र में सक्रियता।	विज्ञापन एवं अनुवाद के सैद्धान्तिक एवं व्यावहारिक स्वरूप का अध्ययन करके विद्यार्थियों में विज्ञापन जगत् एवं अनुवाद के क्षेत्र में सक्रिय होने की क्षमता विकसित होगी।
PSO-7	प्रयोजनमूलक हिंदी का सरकारी एवं गैरसरकारी क्षेत्रों में व्यावसायिक प्रयोग।	विविध क्षेत्रों में हिंदी के प्रयोजनमूलक स्वरूप का अध्ययन करने से विद्यार्थियों में सरकारी एवं गैरसरकारी क्षेत्रों में हिंदी के व्यावसायिक अनुप्रयोग क्षमता विकसित होगी।

Course Outcomes-

Sr. No.	Course Code	Course Title	Course Outcomes
1	HIN-I.C-1	हिन्दी कहानी एवं शब्द साधन	1) छात्रों को कहानी एवं कहानीकारों की जानकारी प्राप्त होगी। 2) कहानियों के माध्यम से छात्र जीवन मूल्यों से परिचित एवं प्रभावित होंगे तथा उनमें संघर्ष भावना एवं आत्मविश्वास पैदा होगा। 3) छात्र व्याकरण को समझने में सक्षम होंगे और व्याकरणिक दृष्टि से शुद्ध हिन्दीलेखनमेंभीप्रवीणहोंगे।
2	HIN -I.C-2	हिन्दीकविताएवं काव्य सौंदर्य	1) विद्यार्थीमध्ययुगीन एवं आधुनिक कवियों और उनकी कविताओं की जानकारी प्राप्त करेंगे। 2) मध्ययुगीन समाज और जीवन दृष्टि से आधुनिक जीवन दृष्टि की तुलनात्मक क्षमता विकसित होगी। 3) विद्यार्थी काव्य रचना की ओर प्रेरित होंगे। 4) विद्यार्थियों में काव्य सौंदर्य की दृष्टि विकसित होगी।
3	HIN-II.C-3	हिन्दी नाटक, वृत्तचित्र एवं फीचर फिल्म	1) विद्यार्थी नाट्य परंपरा से परिचित होंगे। 2) 'एक और द्रोणाचार्य' नाटक एवं नाटककार शंकर शेष के रचना संसार से परिचित होंगे। 3) विद्यार्थियों में अभिनय कौशल के प्रति अभिरुचि पैदा होगी। 4) वर्तमान शिक्षा व्यवस्था की वास्तविकता का परिचय होगा। 5) वृत्तचित्र एवं फीचर लेखन के सैद्धांतिक पक्ष से परिचित होंगे।
4	HIN - II.C-4	हास्य –व्यंग्य निबंध एवं पत्रकारिता	1) विद्यार्थीनिबंध विधा से परिचित होंगे। 2) हास्य एवं व्यंग्य की अवधारणा तथा स्वरूप को समझेंगे। 3) पत्रकारिता का सामान्य परिचय प्राप्त करेंगे।

			4) पत्रकारिता की उपयोगिता एवं महत्त्व समझेंगे।
5	FC-HIN.1	व्यावहारिक हिन्दी	1) विद्यार्थी व्यावहारिक हिन्दी का परिचय प्राप्त करेंगे। 2) विविध क्षेत्रों में व्यावहारिक हिन्दी के प्रयोग से परिचित होंगे। 3) कार्यालयीन पत्राचार से परिचित होंगे। 4) अनुवाद-प्रक्रिया और उसके महत्त्व को समझेंगे। 5) विद्यार्थियों में मानक वर्तनी लेखन की क्षमता विकसित होगी।
6	FC-HIN.2	भाषा कौशल	1) भाषण-कला विकसित होगी। 2) श्रवण-क्षमता का विकास होगा। 3) वाचन-कौशल पैदा होगा। 4) लेखन-कला विकसित होगी। 5) हिन्दी भाषा के व्यवहार में दक्ष होंगे।
7	HIN-III C-5	प्रयोजनमूलक हिन्दी:अनुवाद एवं पत्रलेखन	1) विद्यार्थीप्रयोजनमूलक हिन्दी का परिचय प्राप्त करेंगे। 2) राजभाषा संबंधी प्रमुख प्रावधानों की जानकारी प्राप्त करेंगे। 3) विद्यार्थी अनुवाद कार्य में निपुण होंगे। 4) विद्यार्थी व्यावसायिक एवं कार्यालयीन पत्र लेखन में सक्षम होंगे
8	HIN-IVC-6	हिन्दी पत्रकारिता: मुद्रित एवं इलेक्ट्रोनिक	1) विद्यार्थीस्वाधीनता आंदोलन में हिन्दी पत्रकारिता के योगदान और स्वातंत्र्योत्तर पत्रकारिता के विकास से अवगत होंगे। 2) पत्रकारिता के विविध प्रकारों को समझेंगे। 3) पत्रकार के गुण एवं पत्रकारिता संबंधी कानून का ज्ञान होगा। 4) विद्यार्थियों में रेडियो पत्रकारिता, टेलीविजन पत्रकारिता एवं इंटरनेट पत्रकारिता का कौशल विकसित होगा।
9	HIN-V.C-7	मीडिया लेखन: रेडियो एवं टेलीविजन	1) विद्यार्थियों को मीडिया लेखन के सैद्धान्तिक एवं व्यावहारिक पक्ष का ज्ञान होगा। 2) रेडियो के विविध कौशल की ओर प्रवृत्त होंगे। 3) विद्यार्थियों को टेलीविज़न समाचार या धारावाहिक लेखन संबंधी व्यावहारिक अनुभव होगा। 4) इलेक्ट्रोनिक मीडिया में रोजगार का मार्ग प्रशस्त होगा।
10	HIN-VI.C-8	हिंदी भाषा,लिपि एवं व्याकरण	1) विद्यार्थी हिन्दी भाषा की पृष्ठभूमि एवं उसके विकास से परिचित होंगे। 2) देवनागरी लिपि के विकास एवं मानकीकरण का ज्ञान प्राप्त होगा। 3) हिन्दी की वर्ण-व्यवस्था एवं रूप-रचना से परिचित होंगे।
11	HIN-III E-1	हिन्दी साहित्य का इतिहास (आदिकाल,भक्तिकाल एवं रीतिकाल)	1) हिन्दी साहित्य की आदिकालीन परिस्थितियों एवं विभिन्न काव्य-प्रवृत्तियों से परिचित होंगे। 2) भक्ति आंदोलन के पृष्ठभूमि एवं परिवेश से परिचित होंगे। 3) रीतिकालीन परिवेश एवं प्रवृत्तियों का ज्ञान होगा। 4) प्राचीन भाषाओं के साथ विभिन्न काव्य धाराओं परिचय प्राप्त होगा।
12	HIN-III E-2	मध्यकालीन काव्य (चयनित कविताएँ)	1) मध्यकालीन काव्य की प्रासंगिकता से परिचित होंगे।

			2) सगुण भक्ति काव्य परंपरा और उनकी दार्शनिक मान्यताओं से अवगत होंगे। 3) मीरा के माध्यम से मध्यकालीन नारी जीवन और सामंती व्यवस्था से उसके प्रतिरोध के स्वर को समझेंगे। 4) रीतिकालीन श्रृंगारिक काव्य एवं अभिव्यंजना कौशल को समझेंगे।
13	HIN-III E-3	हिन्दी महिला लेखन	1) इसके माध्यम से स्त्रीवादी चेतना का स्वरूप एवं महत्त्व से परिचित होंगे। 2) परंपरागत साहित्य लेखन एवं महिला लेखन के अंतर को समझेंगे। 3) महिला रचनाकारों एवं उनकी रचनाओं से अवगत होंगे। 4) महिलाओं की सामाजिक समस्याओं एवं नारी चेतना का ज्ञान होगा।
14	HIN-III E-4	हिन्दी दलित लेखन	1) दलित चेतना के स्वरूप एवं महत्त्व से अवगत होंगे। 2) परंपरागत साहित्य लेखन एवं दलित लेखन के अंतर को समझेंगे। 3) विद्यार्थी दलित लेखक एवं उनकी कहानियों से अवगत होंगे। 4) दलितों की सामाजिक स्थिति एवं अपने अस्तित्व के प्रति उनकी जागरूकता को समझने का प्रयास करेंगे।
15	HIN-IV.E-5	हिन्दी साहित्य का इतिहास (आधुनिक काल)	1) आधुनिक हिन्दी साहित्य के परिवेश से परिचित होंगे। 2) आधुनिक काल की काव्य प्रवृत्तियों से अवगत होंगे। 3) हिंदी कहानी एवं उपन्यास के उद्भव और विकास का परिचय प्राप्त करेंगे। 4) निबंध एवं नाटक विधा के विकासक्रम से परिचित होंगे।
16	HIN-IV.E-6	विशेष अध्ययन:सूर्यकांत त्रिपाठी निराला	1) विद्यार्थी निराला के व्यक्तित्व एवं कृतित्व से परिचित होंगे। 2) विद्यार्थी छायावादी काव्य में निराला के प्रदेय से अवगत होंगे। 3) काव्येतर विधाओं में निराला के योगदान को समझेंगे। 4) निराला के साहित्य में प्रगतिशील अवधारणा को समझेंगे।
17	**HIN-IV.E-7**	विशेष अध्ययन: हिन्दी कहानी	1) विद्यार्थी हिन्दी कहानी की विकासयात्रा से अवगत होंगे। 2) प्रेमचंद की कहानी कला परिचित होंगे। 3) हिन्दी कहानी में सूर्यबाला के योगदान का परिचय प्राप्त करेंगे।
18	**HIN-IV.E-8**	हिन्दीसाहित्य का आस्वादन एवं समीक्षा (कविता,कहानी एवं उपन्यास)	1) विद्यार्थी साहित्य के आस्वादन की कला से परिचित होंगे। 2) विद्यार्थी शोध एवं समीक्षा प्रक्रिया से अवगत होंगे। 3) कविता के आस्वादन एवं काव्य-समीक्षा के तत्त्वों से परिचित होंगे। 4) कहानी एवं उपन्यास की समीक्षा के विविध आधारों से अवगत होंगे। 5) शोध सामग्री का संकलन एवं विश्लेषण की क्षमता विकसित होगी।

19	**HIN-V.E-9**	कथेतरगद्यसाहित्य: संस्मरण,यात्रावृतांत,आत्मकथाएवंजीवनी (किसी विधाकीएकपाठ्यपुस्तक)	1) विद्यार्थी कथेतर अन्य विधाओं से परिचित होंगे। 2) संस्मरण और यात्रा-वृतांत लेखन के मूलभूत अंतर की जानकारी प्राप्त करेंगे। 3) आत्मकथा एवं जीवनी विधाओं का अंतर एवं उनके विकास-क्रम को समझेंगे। 4) रेखाचित्र विधा के विकास में रामवृक्ष बेनीपुरी के योगदान से परिचित होंगे।
20	**HIN-V.E-10**	विशेष अध्ययन:हिन्दी उपन्यास	1) उपन्यास के स्वरूप एवं तत्व को समझेंगे। 2) उपन्यास के विकासक्रम से परिचित होंगे। 3) 'निर्मला' उपन्यास के माध्यम से स्त्री जीवन की विडंबनाओं को समझेंगे। 4) 'मोहनदास' की मूल संवेदना से परिचित होंगे। 5) निर्धारित उपन्यासों की आलोचना कर सकेंगे।
21	**HIN-V.E-11**	भारतीय काव्यशास्त्र	1) विद्यार्थी भारतीय काव्यशास्त्र की परंपरा से परिचित होंगे। 2) काव्यशास्त्रीय सिद्धांतों का सामान्य ज्ञान प्राप्त करेंगे। 3) साहित्य-सृजन एवं समीक्षा में काव्यशास्त्र की उपयोगिता को समझेंगे। 4) भारतीय आचार्यों के साहित्य संबंधी चिंतन से परिचित होंगे।
22	**HIN-V.E-12**	हिंदी नाटक	1) विद्यार्थी नाटक के स्वरूप एवं तत्वों से परिचित होंगे। 2) भारतीय नाट्य परंपरा से अवगत होंगे। 3) अभिनय कौशल का विकास होगा। 4) हिन्दी रंगमंच की जानकारी प्राप्त होगी। 5) नाट्य रचना का तात्विक विवेचन करेंगे।
23	**HIN-VI.E-13**	हिंदी निबंध	1) विद्यार्थी निबंध के स्वरूप एवं तत्त्व को समझेंगे। 2) हिंदी निबंध के उद्भव एवं विकास की जानकारी होगी। 3) निबंध लेखन की ओर प्रवृत्त होंगे।
24	**HIN-VI.E-14**	भाषाविज्ञान	1) भाषा एवं भाषाविज्ञान के स्वरूप एवं अध्ययन की विविध दिशाओं से परिचित होंगे। 2) ध्वनि की भाषा वैज्ञानिक जानकारी प्राप्त होगी। 3) रूप रचना, वाक्य रचना संबंधी विविध स्थितियों का ज्ञान होगा। 4) अर्थबोध के साधन एवं अर्थ परिवर्तन के कारणों और दिशाओं का ज्ञान होगा।
25	**HIN-VI.E-15**	पाश्चात्य काव्यशास्त्र	1) पाश्चात्य काव्यशास्त्र की परंपरा से परिचित होंगे। 2) पाश्चात्य विचारकों के काव्य संबंधी चिंतन की जानकारी होगी। 3) पाश्चात्य काव्य सिद्धांतों एवं विविध वादों के आधार पर काव्य समीक्षा की विविध प्रवृत्तियों को समझ सकेंगे। 4) भारतीय एवं पाश्चात्य काव्यशास्त्र केव्यावहारिक अंतर को समझेंगे।
26	**HIN-VI.E-16**	साहित्य का अंतरानुशासनात्मक अध्ययन	1) साहित्य तथा साहित्येतर ज्ञान की अन्य शाखाओं को समझ समझेंगे। 2) साहित्य के अनुशीलन में अन्य अनुशासनों के प्रभाव से परिचित होंगे। 3) साहित्य की अन्य शाखाओं के अंत: संबंध को समझेंगे। 4) अन्य साहित्य का हिन्दी साहित्य पर पड़े प्रभाव से परिचित होंगे।

			5) साहित्य का समाजशास्त्रीय अध्ययन करने में सक्षम होंगे।

B.A. in Konkani
PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life-professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development at local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in Konkani, the students will:		
PSO-1	Problem Analysis and Solutions	Students will be able to interpret the History of Konkani Language, can have Comparative study of Konkani Literature, can do analytical Study of Konkani Folklore and can Critically evaluate different modern trends in the Konkani Literature.
PSO-2	Subject knowledge in Teaching	The basic skills in teaching to work as Teacher and instructor will be achieved by the students which will enrich their instructional strategy to peruse further Higher education in concerned field.

PSO-3	Subject knowledge in other fields	The basic skills in Journalism to work as Editor, Reporters, News Reader, Radio and TV Anchor, Proof readers, Translator and Critiques in print as well as Electronic Media can attained.
PSO-4	Communication Skills	Students will be able to build up Communication Skill, writing skill and other performing skills through the non-academic activities such as street plays, one-act plays, folk dance, creative writing etc.
PSO-5	Critical thinking and research aptitude	Students will be able to analyse, appreciate and examine the different genre of Literature and develop a research skills pertaining to literary criticism.
PSO-6	Life Skill	Students will be able to think sensibly and can have multidimensional as well as social approach to overcome different circumstances through the various socio-literary curriculum designed by the department.

Course Outcomes:

S. No.	Course Code	Course Title	Course Outcomes
1.	KON-I.C-1	**कोंकणी भास आनी साहित्याचो इतिहास - एक वळख** (Outline History of Konkani Language and Literature) (From beginning till 1858)	CO1: कोंकणीचीं भाशीक आनी संस्कृतीक स्थित्यंतरां विद्यार्थ्यांक कळटलीं. CO2: कोंकणी भाशेचो उगम, तशेंच तिची - जडण घडण कशी जाली हाचें गिन्यान कविद्यार्थ्यां मेळटलें. CO3: 16 व्या शेंकड्या मेरेनची कोंकणीची लिखीत परंपरा विद्यार्थ्यांक समजतली. CO4: 1858 आदलें कोंकणी साहित्याचें इतिहासीक दायज विद्यार्थ्यांक कळटलें
2.	KON-I.C-2	**शणै गोंयबाबांचें कोंकणी अस्मिताये खातीर योगदान** (Contribution of Shennoy Goembab towards Konkani Identity)	CO1: शणै गोंयबाबांच्या वेंचीक साहित्याच्या अभ्यासांतल्यान विद्यार्थ्यांक गोंयची समाजीक जडण घडण हांचेविशीं म्हायती मेळिल्ल्यान तांकां गोंय आनी गोंयकारपण समजून घेवपाक आधार जातलो. CO2: आपली निजाची संस्कृताय आनी ताची वळख विद्यार्थ्यांक जातली. CO3: आपले खाशेले संस्कृतायेचो अभ्यास बरेतरेन केल्ल्यान हेर समाजांतल्या लोकांकडेन पळेवपाच्या आनी हेर वेव्हारांत विशालतायेची नदर विद्यार्थ्यांक येतली. CO4: शणै गोंयबाबांच्या वेंचीक साहित्याच्या अभ्यासांतल्यान अस्मिताये पासत दिल्ल्या योगदानाची म्हायती मेळटली.

3.	KON-II.C-3	**कोंकणी चळवळीचो इतिहास - एक वळख** (1858 वर्स ते 1992 वर्स मेरेनचो काळ) (Outline History of Konkani Movement) (Period from 1858 till 1992)	CO1: कोंकणीमराठी संघर्शाच्या साबार-कारणांची वळख विद्यार्थ्यांक जातली. CO2: गोंय मुक्ती आदल्या आनी उपरांतच्या कोंकणी चळवळीचें गिन्यान विद्यार्थ्यांक मेळटलें. CO3: 1961 ते 1992 मेरेनच्या कोंकणी चळवळींतलीं साबार तासां विद्यार्थ्यांक कळटलीं CO4: कोंकणी चळवळींत संस्थांनी आनी व्यक्तींनी दिल्लें योगदान कळटलें.
4.	KON-II.C-4	**कोंकणी बोलींचो अभ्यास** (Study of Konkani Dialects)	CO1: कोंकणी भाशेच्या वेगवेगळ्या बोलींचो अभ्यास केल्ल्यान विद्यार्थ्यांक त्यो समजुपाक मदत जातली. CO2: आपले निजाचे भाशेच्या बोलींची वळख जाल्ल्यान विद्यार्थ्यांक हेर बोलयो उलोवपी लोकांनी उलयल्ली भास समजून घेवपाक आधार जातलो. CO3: बोलींचो आनी त्यो उलोवपी लोकांचें खाशेलेपण कळटलें.
5.	KON-III.C-5	**कोंकणी भाशेचो व्याकरणीक आनी भाशाशास्त्रीय अभ्यास** (Grammatical and Linguistic Study of Konkani)	CO1: स्वर आनी व्यंजन हांची म्हायती तशेंच वाक्य बांदावळीची वळख जातली. CO2: विद्यार्थ्यांक भास व्याकरण ,आनी भासविज्ञानाचें भाशेंतलें म्हत्व समजतलें. CO3: भास आनी व्याकरण हांचो संबंद समजतलो. CO4: भासविज्ञान आनी ताच्या वेगवेगळ्या आंगांची वळख जातली. CO5: भासविज्ञान अभ्यासाच्या वेगवेगळ्या रितींची वळख जातली.
6.	KON-IV.C-6	**कोंकणी लोकवेदाचो अभ्यास** (Study of Konkani Folklore)	CO1: विद्यार्थी कोंकणी लोकवेदाचो सखोल अभ्यास करतले. CO2: कोंकणी लोकवेदाचे साबार घटक विद्यार्थी अभ्यासतले.

			CO3: विद्यार्थ्यांक कोंकणी लोकवेदाच्या साबार प्रकारांची वळख जातली. CO4: कोंकणी लोकवेदाच्या वेंचीक प्रकारांची अभ्यासणी करपाक विद्यार्थी भोंवडी करतले.
7.	KON-V.C-7	**गोंय मुक्ती उपरांतचीं कोंकणी साहित्यांतलीं स्थित्यंतरां** (कोंकणी कविता ,कथा आनी नाटकाचीं स्थित्यंतरां) (Important Trends in Post Liberation Konkani Literature)	CO1: कोंकणी साहित्याचीं मुखेल स्थित्यंतरां विद्यार्थ्यांक कळटलीं. CO2: कोंकणी साहित्य प्रवाहांचो अभ्यास जातलो. CO3: वेंचीक कोंकणी साहित्य प्रवाहांचें संकलन जातलें. CO4: मुखेल प्रवाहांची मोलावणी जातली.
8.	KON-VI.C-8	**भारतीय आनी पाश्चात्य काव्यशास्त्राची वळख** (Introduction to the Study of Indian and Western Poetics)	CO1: विद्यार्थी भारतीय आनी पाश्चात्य काव्यशास्त्राची फाटभूंय समजून घेतले. CO2: विद्यार्थी भारतीय आनी पाश्चात्य काव्यशास्त्राचो पुराय अभ्यास करतले. CO3: भारतीय काव्यशास्त्राची वळख विद्यार्थ्यांक जातली. CO4: पाश्चात्य काव्यशास्त्राची वळख विद्यार्थ्यांक घडटली.
9.	FC-KON-I	**कोंकणी वाचन लेखन कौशल्य** (Study of Spoken and Written Skills in Konkani)	CO1: विद्यार्थी कोंकणी व्याकरण आनी शुद्धलेखन शिकतले. CO2: कोंकणी भाशेचीं खाशेलपणां विद्यार्थी शिकतले. CO3: विद्यार्थी कोंकणी भाशेंतल्यान वेव्हारीक लेखनाचो अभ्यास करतले. CO4: कोंकणी भाशेक उपयोगी संगणकीय तंत्रज्ञान गरजेचें हे पासत कोंकणी टायपसेटींग कौशल्य शिकतली

10.	FC-KON-II	**कोंकणी भाशेचीं मौखीक आनी लेखन कौशल्यां** (Spoken and Written Skills of Konkani Language)	CO1: कोंकणी विद्यार्थी कोंकणी भाशेंत मौखीक कौशल्यां शिकतलो. CO2: कोंकणी विद्यार्थी कोंकणीचीं लिखीत कौशल्यां अभ्यासतलो. CO3: ह्या अभ्यासक्रमांतल्यान छापील आनी इलॅक्ट्रॉनीक प्रसार माध्यमां खातीर बातम्यो सांगपी, निवेदक आनी संपादक तयार जातले. CO4: साबार कार्यावळींचें सुत्रसंचालक वा संयोजक तयार जातले.
11.	GEC-KON-I	**कोंकणी एकांकी आनी पथनाट्य - एक अभ्यास (भाग – 1)** (A Study of Konkani One Act Play & Street Play) (Part – 1)	CO1: विशय घेतिल्ले विद्यार्थी एकांकी ह्या साहित्य प्रकाराचें शास्त्रीय गिन्यान घेवंक शकतले. CO2: संबंदीत विशय घेतिल्ले विद्यार्थी एकांकीच्या सादरीकरणाचें तंत्र शिकतले. CO3: विद्यार्थ्यांच्या कलागुणांक माची मेळटली. CO4: नाट्य सादरीकरणांतल्यान विद्यार्थ्यांच्या व्यक्तिमत्वांत भर पडटली.
12.	GEC-KON-II	**कोंकणी एकांकी आनी पथनाट्याचो अभ्यास – (भाग - 2)** (Study of Konkani One Act Play & Street Play) (Part – 2)	CO1: विद्यार्थी पथनाट्य ह्या साहित्य प्रकाराचें शास्त्रीय गिन्यान घेवंक शकतले. CO2: विद्यार्थ्यां मदीं पथनाट्यांतल्यान समाजीक जाणीव निर्माण जातली. CO3: विद्यार्थ्यांच्या साबार कलागुणांक माची मेळटली. CO4: नाट्य सादरीकारणांतल्यान विद्यार्थ्यांच्या व्यक्तिमत्वांत भर पडटली.
13.	KON-III.E-1	**कोंकणी कविता एक – खाशेलो अभ्यास** (Special Study of Konkani Poetry)	CO1: विद्यार्थ्यांक आर्विल्ले कोंकणी कवितेची वळख जातली. CO2: कोंकणी कवितेची इतिहासीक फाटभूंय विद्यार्थांक कळटली. CO3: विद्यार्थी कोंकणी कवितेच्या साबार प्रवाहांचें आस्वादन करूंक शकतले. CO4: विद्यार्थी वेंचीक कोंकणी कवींचो आनी तांच्या कवितांचो अभ्यास करतले.

14.	KON-III.E-2	**कोंकणी कथेचो खाशेलो अभ्यास** (Special Study of Konkani Short Story)	CO1: विद्यार्थ्यांक कथा ह्या साहित्य प्रकाराची सिध्दांतीक वळख घडिल्ल्यान तांकां कथा हो साहित्य प्रकार समजून घेवपाक आदार जातलो. CO2: कोंकणी साहित्यांत कथा ह्या साहित्य प्रकाराचो विकास कसो जालो ताची वळख विद्यार्थ्यांक जातली. CO3: विद्यार्थ्यांक कोंकणी कथेच्या मळार वावर करपी वेंचीक कथाकारांचें योगदान समजतलें. CO4: कथा बरोवपाची आनी कथेचें आस्वादन करपाची विद्यार्थ्यांची तांक विकसीत जातली.
15.	KON-III.E-3	**कोंकणी कादंबरेचो खाशेलो अभ्यास** (Special Study of Konkani Novel)	CO1: विद्यार्थ्यांक आर्विल्ले कोंकणी कादंबरेचो अभ्यास जातलो. CO2: कोंकणी कादंबरेचो आरंभ आनी उदरगत कशी जाल्या तें विद्यार्थी शिकतले. CO3: विद्यार्थ्यांक कोंकणी कादंबरेच्या प्रवाहांची वळख जातली. CO4: विद्यार्थ्यांक वेंचीक कोंकणी कादंबरेचो खोलायेन अभ्यास करपाची संद मेळटली.
16.	KON-III.E-4	**कोंकणी साहित्याचें आस्वादन** (Part-1) (कथा ,कविता आनी कादंबरी) (Appreciation of Selected Konkani Writings) (Part-1)	CO1: कोंकणी साहित्याची स्थित्यंतरां विद्यार्थ्यांक कळटलीं. CO2: आयच्या कोंकणी साहित्याचो पांवडो खंय आसा ताचो सोद लागतलो. CO3: नव्या साहित्यीक विशयांचेर स्वाध्याय बरोवन जातले. CO4: कोंकणी समिक्षेक उर्बा मेळटली.
17.	KON-IV.E-5	**कोंकणी नाटक एक – अभ्यास खाशेलो** (Special Study of Konkani Drama)	CO1: विद्यार्थ्यांक अर्विल्ल्या कोंकणी नाटकाची वळख जातली. CO2: कोंकणी नाटकाची इतिहासीक फाटभूंय विद्यार्थ्यांक कळटली. CO3: विद्यार्थी कोंकणी नाटकाच्या साबार

			प्रवाहांचें आस्वादन करूंक शकतले. CO4:विद्यार्थी वेंचीक कोंकणी नाटकाचो अभ्यास करतले.
18.	KON-IV.E-6	**कोंकणी तियात्राचो अभ्यास** (Special Study of Konkani Tiatr)	CO1:विद्यार्थ्यांक आर्विल्ल्या कोंकणी तियात्राची वळख जातली. CO2:कोंकणी तियात्राची इतिहासीक फाटभूंय विद्यार्थ्यांक कळटली. CO3:विद्यार्थी कोंकणी तियात्राच्या साबार प्रवाहांचें आस्वादन करूंक शकतले. CO4:विद्यार्थी वेंचीक कोंकणी तियात्राचो अभ्यास करतले.
19.	KON-IV.E-7	**कोंकणी निबंदाचो खाशेलो अभ्यास** (Study of Konkani Essays)	CO1:कोंकणी विभागांत शिकपी विद्यार्थ्यांक निबंद साहित्य प्रकाराची सिध्दांतीक वळख घडिल्ल्यान तांकां निबंद हो साहित्य प्रकार समजून घेवपाक आधार जातलो. CO2:कोंकणी साहित्यांत निबंद साहित्य प्रकाराचो विकास कसो जालो ताची वळख विद्यार्थ्यांक जातली. CO3:कोंकणी निबंदाच्या मळार वावर करपी वेंचीक निबंदकारांचें योगदान समजून घेवपाक विद्यार्थ्यांक आधार जातलो. CO4:निबंद बरोवपाची आनी निबंदाचें आस्वादन करपाची विद्यार्थ्यांची तांक विकसीत जातली.
20.	KON-IV.E-8	**कोंकणी साहित्याचें आस्वादन** **(भाग - 2)** (निबंद,नाटक,तियात्र) (Appreciation of Selected Konkani Writings) (Part-2)	CO1:कोंकणी साहित्याचीं स्थित्यंतरां विद्यार्थ्यांक कळटलीं. CO2:आयच्या कोंकणी साहित्याचो पांवडो खंय आसा ताचो सोद लागतलो. CO3:नव्या साहित्यीक विशयांचेर स्वाध्याय बरोवन जातले. CO4:कोंकणी समिक्षेक उर्बा मेळटली.

21.	KON-V.E-9	**चित्रपट आनी नाटक आस्वादन** (Film and Drama Appreciation)	CO1: विद्यार्थ्यांक चित्रपट आनी नाटकाच्या आस्वादनाचें म्हत्व समजतलें. CO2: चित्रपट आनी नाटक हांचो संबंद समजतलो. CO3: चित्रपट आनी नाटकाच्या वेगळ्या वेगळ्या आंगांची वळख जातली. CO4: चित्रपट आनी नाटकाच्या आस्वादनाची वळख जातली. CO5: चित्रपट आनी नाटकाच्या वेगळ्या वेगळ्या प्रकारांची वळख जातली.
22.	KON-V.E-10	**वैंचीक कोंकणी कादंबरेचो समाजीक अभ्यास** (Social Study of Selected Konkani Novel)	CO1: विद्यार्थ्यांक साहित्याच्या माध्यमांतल्यान समाजीक विशयांचें म्हत्व समजतलें. CO2: साहित्यभास आनी समाज हांचो संबंद , .समजतलो CO3: साहित्य आनी समाजाच्या वेगळ्या वेगळ्या घटकांची वळख जातली. CO4: साहित्य कृतींतल्यान संस्कृतायेच्या वेगळ्या वेगळ्या आंगांची वळख जातली.
23.	KON-V.E-11	**कर्नाटक आनी केरळ राज्यांतल्या कोंकणी साहित्याची वळख** (Introduction of Konkani Literature from Karnataka and Kerala)	CO1: विद्यार्थ्यांक कर्नाटक आनी केरळ राज्यांतल्या कोंकणी साहित्याचें म्हत्व समजतलें. CO2: कर्नाटक आनी केरळ कोंकणी साहित्याविशीं म्हायती समजतली. CO3: कर्नाटक आनी केरळ साहित्याची वळख जातली.
24.	KON-V.E-12	**कोंकणीच्या भोवआयामी वावरांत वैंचीक व्यक्तीमत्वांचो अभ्यास** (Special Study of Multifacets Konkani Personalities)	CO1: विद्यार्थ्यांक लेखकाच्या साहित्याच्या माध्यमांतल्यान समाजीक विशयांचें म्हत्व समजतलें. CO2: लेखकाचें साहित्य ,भास आनी समाज हांचो संबंद समजतलो. CO3: लेखकाचें साहित्य आनी समाजाच्या वेगवेगळ्या घटकांची वळख जातली. CO4: लेखकाच्या साहित्य कृतींतल्यान वेगवेगळ्या आंगांची वळख जातली.

25.	KON-VI.E-13	**कोंकणी अध्यापनाची पद्धत** (Konkani Teaching Methodology)	CO1: विद्यार्थ्यांक कोंकणी भाशेचें म्हत्व समजतलें. CO2: अध्ययन आनी अध्यापन समजतलें. CO3: अध्यापनाच्या आंगांचीं वळख जातली. CO4: अध्यापनाच्या प्रकारांची वळख जातली. CO5: विद्यार्थ्यांच्या मानसीकतायेची वळख जातली.
26.	KON-VI.E-14	**अर्विल्ल्या प्रसारमाध्यमांचो अभ्यास** (Study of Modern Medias)	CO1: विद्यार्थ्यांक प्रसारमाध्यमांचो आरंभ आनी इतिहासीक फाटभूंय समजतली. CO2: अर्विल्ल्या प्रसारमाध्यमांची शास्त्रीय अभ्यासणी विद्यार्थी करतले. CO3: अर्विल्ल्या प्रसारमाध्यमांचीं साबार आंगां आनी कौशल्ल्यां विद्यार्थ्यांक कळटलीं CO4: कोंकणी प्रसारमाध्यमां खातीर पत्रकार , ,निवेदकपटकथा लेखक ,बातमी सांगपी आदी तयार जातले.
27.	KON-VI.E-15	**कोंकणी लिप्यंतरीत साहित्याचो अभ्यास** (कन्नड आनी रोमी लिपींतल्यान) Study of Transliterated Konkani Literature (From Kannada and Romi Script)	CO1: कोंकणी भास बरोवपाच्या पांच लिपयांची वळख विद्यार्थ्यांक घडटली. CO2: कन्नड आनी रोमी लिपयांनी रचिल्ल्या साहित्याची उडटी वळख विद्यार्थ्यांक घडटली. CO3: कन्नड लिपयेंतल्यान देवनागरींत उजवाडाक आयिल्ल्या वेंचीक साहित्यकृतीचो अभ्यास जातलो. CO4: रोमी लिपयेंतल्यान देवनागरींत उजवाडाक आयिल्ल्या वेंचीक साहित्यकृतीचो अभ्यास जातलो.
28.	KON-VI.E-16	**अनुवाद अभ्यास** (Translation Study)	CO1: अनुवाद तंत्राचो अभ्यास विद्यार्थी करतले. CO2: अणकार करपाचें कसब विद्यार्थी शिकतले. CO3: सर्जनशील साहित्याचो अणकार करपाचो सराव विद्यार्थी सेगीतपणान करतले.

			CO4:कोंकणी विद्यार्थ्यां मदीं अनुवादकाची वृत्ती आनी कौशल्य विकसीत जावपाक मदत जातली.

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes **Graduates will be able to :**
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Name of the Department : **PHYSICS**

- **PSO1 :** Strengthen the understanding of basic concepts of Physics and impart required mathematical skills.
- **PSO2 :** Provide a strong base in Experimental Physics to pursue higher studies/research in Experimental Physics.
- **PSO3 :** Provide a sound foundation in Theoretical Physics to pursue higher studies/research in Theoretical Physics
- **PSO4 :** Developing analytical thinking and logical reasoning.
- **PSO5:** Enhancing problem solving skills.
- **PSO6 :** Promote self-learning, self-confidence, communication skills and team work.
- **PSO7:** Enhancing employability through skill enhancement courses.

COURSE OUTCOMES

S. No.	Course Code	Course Title	Course Outcomes At the end of this course students will be able to:
1	**PHY-I.C-1**	**Introduction to Mathematical Physics**	**CO1:** Have a good understanding of vector analysis and its application in physics. **CO2:** Have a good grasp on various tests used to test the convergence and divergence of different kinds of series and learn how to expand a function in power series. **CO3:** Understand the basics of complex numbers. **CO4:** Have an understanding of matrix operations and properties of matrices. **CO5:** Learn basics of partial differentiation and its application in physics. **CO6:** Be able to solve ordinary first and second order differential equations important in the physical sciences, **CO7:** familiarize with spherical and cylindrical coordinate systems.

			CO8: Use mathematical techniques to solve several problems in physics and enhance problem solving skills.
2	**PHY-I.C-2**	**Mechanics I**	**CO1:** develop qualitative and quantitative understanding of Newtonian mechanics in one and two dimensions and solve the Newton equations for simple configurations. **CO2:** understand the Law of Conservation of Linear Momentum and Angular Momentum and apply these laws to understand elastic and inelastic collision, motion of a rocket and Kepler's law. **CO3:** demonstrate the knowledge of work and energy in kinetics **CO4:** understand the Principle of Conservation of Mechanical Energy (for conservative forces) and apply this law to problems of objects moving under the influence of conservative forces. **CO5:** develop ideas of Newtons Law of gravity, gravitational field and potential energy by solving various problems.
3	**PHY-II.C-3**	**Heat and Thermodynamics**	**CO1:** Understand different types of temperature scales and relationship between different scales of temperature. **CO2:** Able to relate the effects of changes in temperature, pressure and volume on physical systems at macroscopic scale by analyzing collective motion of their particles. **CO3:** Able to comprehend the first law of thermodynamics to represent the relationship between heat and mechanical work. **CO4:** Able to comprehend the second law of thermodynamics to depict the manner in which thermodynamic changes take place. **CO5:** Explain the usefulness of these concepts for wide range of applications that include heat engines, refrigerators and air conditioners.

			CO6: Calculate change in entropy in matter during change in phase.
4	**PHY-II.C-4**	**Electricity and Magnetism**	**CO1 :** Comprehend basic concepts like: laws of electrostatics and magneto statics and also related applications. **CO2 :** Understand the interrelated concepts of Electricity and Magnetism. **CO3 :** Understand the working of transient circuits and alternating current circuits. **CO4 :** Correlate the theoretical basis of various concepts of electricity and magnetism while performing experiments.
5	**PHY-II.C-5**	**Electromagnetic Theory – I**	**CO1:** Apply vector calculus to understand concepts in electrostatics. **CO2:** Comprehend the interaction between charges in vacuum as well as in medium. **CO3:** Calculate the electric field and electrical potential for discrete charges and continuous distribution of charge. **CO4:** Applysuitabletechniques to solve various electrostatic problems. **CO5:** Understand how ferroelectric materials can be used as memory devices.
6	**PHY-E1**	**Optics**	**CO1 :** Understand the image formation for various optical systems. **CO2 :** Differentiate between optical phenomena like Interference, Diffraction and Polarization. **CO3 :** Correlate the theoretical basis of various concepts of Geometrical Optics and Physical Optics while performing experiments **CO4 :** Develop understanding towards the different phenomena exhibited by light.
7	**PHY-E2**	**Modern Physics**	**CO1 :** have an understanding of constituents of an atom and atomic structure. **CO2 :** discuss and interpret experiments that reveal the wave properties of matter.

			CO3 : discuss and interpret experiments that reveal the particle properties of waves and wavelike properties of particle. **CO4:** apply uncertainty principle to solve physics problems **CO5:** understand the working of mass spectrographs and accelerators **CO6:** understand the basic operating principle of the laser and the optical fiber.
8	**PHY-E3**	**Oscillations, Waves and Sound**	**CO1 :** Set up an equation of motion for simple harmonic motion and obtain its solution. **CO2 :** Explain how superposition of waves leads to different Lissajous figures. **CO3 :** Set and solve the equation of motion for damped and driven damped harmonic oscillators and analyse the nature of oscillations. **CO4:** Understand the dependence of velocity of sound waves on various factors like temperature, pressure, density, humidity. **CO5:** Solve problems for different cases of Doppler effect.
9	**PHY-E17**	**Introduction to Astronomy and Astrophysics**	**CO1 :** Understand the various Extra-galactic objects. **CO2 :** Understand the construction, working and mounting of modern telescopes. **CO3 :** Understand co-ordinate system of Celestial Objects. **CO4 :** Understand types of stars and their life cycle.
10	**PHY-II.C-6**	**Quantum Mechanics**	**CO1 :** understand central concepts and principles in quantum mechanics, such as the Schrödinger equation, the wave function and its statistical interpretation, the uncertainty principle, stationary and non-stationary states, time evolution of solutions. **CO2 :** solve the Schrödinger equation to obtain wave functions for some important types of potential in one and three dimension and give concise physical interpretations and reasoning underlying the mathematical results **CO3 :** grasp the concepts of angular momentum and spin. **CO4 :** have an insight into fundamental issues in quantum mechanics like the EPR paradox, Bells theorem and Schrödinger's cat

			CO5: develop an understanding of why both analytic and numerical solutions are important in quantum mechanics and have acquired experience in using both types of methods on quantum mechanical problems **CO6:** use numerical tools and software to solve the Schrodinger equation for more complicated cases.
11	**PHY-E5**	**Electronics-I**	**CO1 :** Understand the fundamentals of semiconductor behavior and the operation of basic semiconductor devices. **CO2 :** Understand basic circuit laws; semiconductor based analog circuits from a fundamental point of view. **CO3 :** Use this knowledge to describe bipolar transistors and its applications. **CO4 :** Understand and apply the concept of feedback to study operational amplifier and sinusoidal oscillators.
12	**PHY-E6**	**Solid State Devices**	**CO1 :** Comprehend the p-n junction theory and analyse the effect of heat and light on the performance of the semiconductor devices. **CO2:** Understand different types of special diodes and their uses in various electronics applications. **CO3 :** Understand different types of optoelectronic devices and their uses in various electronics applications. **CO4:** Design, construct and study the performance of circuits based on breakdown devices. **CO5 :** Corelate the theory to understand the working of these devices.
13	**PHY-E4**	**Properties of Matter and Acoustics**	**CO1 :** Gain an introductory knowledge of dynamics of rigid bodies, and its applications to basic physical problems. **CO2 :** Familiarize with of acoustics of rooms and musical scales. **CO3 :** Comprehend the phenomenon of elasticity, surface tension, viscosity and their application.
14	**PHY-E7**	**Computational Physics**	**CO1 :** Understand various numerical methods **CO2 :** Use FORTRAN language for numerical calculations.

			CO3 : Understand various concepts of Physics using numerical methods using FORTRAN as a programming language. **CO4 :** Solve problems in Physics by numerical methods using FORTRAN as a programming language.
15	**PHY-II.C-7**	**Electromagnetic Theory – II**	**CO1 :** Calculate magnetic field induction using Biot-Savart's law and Ampere's law. **CO2 :** Interpret bound currents and calculate magnetic fields in matter. **CO3 :** Comprehend microscopic theory magnetism. **CO4 :** Establish the link between electrostatics and magnetostatics using Maxwell's equations. **CO5:** Develop the wave equation for propagation of electromagnetic waves through material media and vacuum at different angles of incidence.
16	**PHY-E9**	**Solid State Physics**	**CO1 :** Understand firmly the basics of Solid State Physics. **CO2 :** Understand the link between the structural aspects and the various physical properties of crystalline solids. **CO3 :** Gain a comprehensive broad knowledge in topic such as: Bonding in Solids, Crystal Physics, Electrical properties of solids, Origin of energy band structure in solids and Magnetic properties of materials.
17	**PHY-E10**	**Thermodynamics and Statistical Mechanics**	**CO1 :** Understand basics of kinetic theory of gases and thermodynamic potentials. **CO2 :** Understand Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein statistics and its application to the classical gas, electrons in a metal and blackbody radiation **CO3 :** Understand the specific heat of solids by invoking statistical mechanics.
18	**PHY-E11**	**Electronics-II**	**CO1** : Analyse AC circuits and apply the techniques in designing circuits. **CO2:** Generate different kinds of waves using OP-Amp **CO3:** Understand the basic concepts of 555 timer. **CO4:** Develop the ideas of monolithic linear

			regulators and understand different types of voltage regulators in LM series **CO5:** Apply binary operations to different digital circuits **CO6:** Understand the clocked digital electronics and its applications in different types of counters
19	**PHY-E12**	**Mathematical Physics**	**CO1 :** Comprehend the functions of complex variables. **CO2 :** Apply mathematical techniques such as: calculus of residues to evaluate definite integrals. **CO3:** Apply solutions of Legendre, Bessel and Hermite equations, Fourier transforms of different functions in solving various Physics problems. **CO3 :** Able to solve higher order problems in Physics**.**
20	**PHY-II.C-8**	**Atomic and Molecular Physics**	**CO1 :** solve the case of the hydrogen atom using the three dimension time-independent Schroedinger equation, identify atomic effect such as space quantization and interpret the wave functions and probability densities. **CO2 :** become familiar with the orbital, spin and total angular momentum of many electron atoms. **CO3 :** explain the observed dependence of atomic spectral lines on externally applied magnetic fields. **CO4:** grasp the physics of diatomic molecules, their electronic states, vibrations and rotations and their spectra. **CO5:** comprehend classical and quantum theory of Raman effect. **CO6:** develop analytical and computing skills through problem solving, and computer based exercises, which involve quantum mechanical systems such as the Harmonic oscillator, Hydrogen atom and Morse potential.
21	**PHY-E13**	**Mechanics – II**	**CO1 :** Separate two body problem into two equivalent single body problems **CO2 :** Establish equation of orbit for the motion under inverse square law force and study different types of orbits. **CO3 :** Establish the relation between time

			derivative of a vector in a fixed frame of reference with respect to moving frame of reference. **CO4:** Comprehend the occurrence of some pseudo forces due to relative motion between frames of references such as Coriolis's force, centrifugal force **CO5:** Understand the motion of rigid bodies by solving Euler's equations of motion. **CO6:** Understand the advantages of Lagrangian formulation over Newtonian formulation. **CO7:** Solve various mechanical problems using Lagrangian equation of motion
22	**PHY-E14**	**Nuclear and Elementary Particle Physics**	**CO1 :** Understand the fundamental principles governing the basic properties of nuclei, nuclear structure and particle physics. **CO2 :** Able to solve elementary problems, relating theoretical predictions and measurement results, in nuclear and particle physics.
23	**PHY-E15**	**Introduction to Special Theory of Relativity**	**CO1 :** Understand the limitations of Newtonian relativity at speeds close to the speed of light. **CO2 :** Learn the postulates of special theory of relativity and understand the connection between space and time. **CO3 :** Comprehend the concepts of relativistic velocity, relativistic mass and equivalence of energy and mass. **CO4 :** Learn about the doppler effect in relativity.
24	**PHY-E16**	**Introduction to Materials Science**	**CO1 :** Understand the fundamentals of materials science. **CO2 :** Understand the properties and applications of materials. **CO3 :** Investigate the relationship that exists between the structures and properties of materials.
25	**PHY-E8**	**Instrumentation**	**CO1 :** Understand basic concepts related to the various types of measuring instruments and measuring techniques. **CO2 :** Comprehend basic principles involved in measuring instruments like Ammeter, Voltmeter, Ohmmeter and Multimeters. **CO3 :** Understand working and use of CROs and Signal Generators

			CO4 : Understand working and usage of the various types of transducers.

B.A. in Marathi

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life- professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development at local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO)		
PSO-1	भाषिक क्षमता	विविध साहित्यप्रकारांच्या अध्ययनातून साहित्यप्रकारांचे वाचन, लेखन करण्याची क्षमता विद्यार्थ्यांमध्ये निर्माण होईल.
PSO-2	साहित्य आस्वादन, मूल्यांकन आणि संशोधन	साहित्याचे परीक्षण, समीक्षण, मूल्यमापन आणि संशोधन या बाबतीतला दृष्टीकोन विकसित होईल.
PSO-3	प्रसारमाध्यमांसाठीची लेखनकौशल्ये आणि रोजगारक्षमता	प्रसारमाध्यमांसाठीची लेखनकौशल्ये व माहिती आणि जनसंपर्क यांच्यासाठी लागणाऱ्या भाषिक कौशल्यांचे विकसन होऊन या क्षेत्रात काम करण्यासाठी लागणारी रोजगारक्षमता प्राप्त होईल.
PSO-4	स्वयंरोजगाराची क्षमता	साहित्यविषयक उपक्रमशिलतेच्या अध्ययनातून स्वयंरोजगाराची दृष्टी विकसित होऊन व्यावसायिकदृष्ट्या अर्थप्राप्तीचे साधन म्हणून याचा वापर करण्याची क्षमता निर्माण होईल.

PSO-5	व्यक्तिमत्त्व विकास आणि नेतृत्व गुणांची जोपासना	व्यक्तिमत्व विकास आणि वैयक्तिक पातळीवरील नेत्तृत्व गुणांची जोपासना करण्याबरोबरच सामाजिक आणि सांस्कृतिक क्षेत्रात आवड निर्माण होईल.
PSO-6	भाषाभ्यास व भाषांतर क्षेत्रामध्ये काम करण्याची क्षमता.	भाषाभ्यास व अनुवाद यांच्या सैद्धांतिक आणि व्यावहारिक स्वरूपाच्या अध्ययनामुळे भाषाभ्यास करणाऱ्या संस्था आणि अनुवादाच्या क्षेत्रामध्ये काम करण्याची आवड व क्षमता निर्माण होईल.
PSO-7	व्यावहारिक भाषिक कौशल्यांचा विकास.	व्यावहारिक मराठीच्या अध्ययनामुळे कार्यालयीन लेखन, स्पर्धा परीक्षांसाठी आवश्यक भाषा कौशल्यांचे विकसन होऊन प्रशासकीय क्षेत्रात सक्रीय होण्यासाठीची क्षमता निर्माण होईल.

Course Outcomes-

Sr. No.	Course Code	Course Title	Course Outcomes
1	MAR-I.C-1	मराठी कथा स्वरूप आणि उपयोजन (1945 - 2000)	1. सैध्दांतिक व उपयोजित स्तरावर कथा या साहित्यप्रकाराचे अध्ययन केल्यामुळे या साहित्यप्रकाराचे वाचन आणि लेखन करण्याची क्षमता विद्यार्थ्यांमध्ये निर्माण होईल. 2. कथेचे परीक्षण आणि समीक्षण करणे शक्य होईल. 3. इतर सर्वच लेखनप्रकाराचा पायाभूत लेखनप्रकार म्हणून या प्रकाराची ओळख विद्यार्थ्यांना होऊ शकेल. 4. विविध नियतकालिकातून कथालेखन करून अर्थलाभ होऊ शकेल.
2	MAR-I.C-2	आधुनिक मराठी कविता स्वरूप व उपयोजन (आरंभ ते 2000)	1. कविता या साहित्यप्रकाराच्या सूक्ष्म अध्ययनामुळे या साहित्यप्रकाराचे वाचन व लेखन करण्याची क्षमता निर्माण होईल. 2. काव्याचे परीक्षण, समीक्षण करता येईल. 3. विविध प्रसार माध्यमातून कविता प्रसिद्ध होतील. त्यामुळे प्रसिद्धी व अर्थलाभ दोन्ही होईल. 4. काव्यसंग्रह लेखन, संपादन इ. तयारी होईल.
3	FC-MAR.1	व्यावहारिक मराठी	1. मराठीचा कार्यालयीन, व्यावहारिक कामकाजात कसा वापर होतो त्याची माहिती होईल. 2. दैनंदिन व्यवहारात भाषा व्यवहारासाठी आवश्यक असलेल्या लेखन कौशल्याचा विकास होईल. 3. नोकरी व्यवसाय सांभाळूनही फावल्या वेळात या लेखन कौशल्यामुळे अर्थप्राप्ती होऊ शकेल. 4. स्वतंत्रपणे या लेखनकौशल्यामुळे विद्यार्थ्यांच्या ठिकाणी रोजगारक्षमता प्राप्त होऊ शकेल.
4	MAR-II.C-3	मराठी कादंबरी स्वरूप व उपयोजन (1945-2000)	1. सैध्दांतिक व उपयोजित स्तरावर कादंबरी या साहित्यप्रकाराचे अध्ययन केल्यामुळे या

			साहित्यप्रकाराचा नेमका अभ्यास करण्याची व मूल्यमापन करण्याची क्षमता विद्यार्थ्यांमध्ये निर्माण होईल. 2. तसेच मराठीतील महत्त्वाच्या कादंबरीकारांचा परिचय होईल. 3. कादंबरीलेखनाविषयीची आवड निर्माण होईल. 4. कादंबरीचे सूक्ष्म वाचन कसे करावे, परीक्षण कसे करावे आणि कादंबरीचे अध्यापन कसे करावे याची पूर्व तयारी होईल.
5	MAR-II.C-4	मराठी नाटक स्वरूप व उपयोजन (1950-2000)	1. सैध्दांतिक व उपयोजित स्तरावर नाटक या साहित्यप्रकाराचे अध्ययन केल्यामुळे नाट्याभ्यासाची एक दृष्टी विद्यार्थ्यांकडे येईल. 2. विद्यार्थ्यांच्या मनामध्ये या प्रकाराविषयी आवड निर्माण होऊन या साहित्यप्रकाराचे मूल्यमापन करण्याची क्षमता विद्यार्थ्यांमध्ये निर्माण होईल. 3. नाटक लिहिण्याची आवड निर्माण होईल. 4. व्यावसायिकदृष्ट्या नाटकांचे दिग्दर्शन, आयोजन करण्यासाठीची भूमिका तयार होईल.
6	FC-MAR.2	मराठी वाचन लेखन कौशल्य	1. लेखन क्षमता विकसित झाल्यामुळे सर्व माध्यमांसाठी त्या - त्या लेखनप्रकारानुसार विद्यार्थ्यांच्या ठिकाणी लेखनकौशल्ये विकसित होऊ शकतील. 2. अर्थप्राप्तीच्या दृष्टीने ही लेखनकौशल्ये अत्यंत उपयुक्त ठरतील. 3. या लेखनकौशल्यामुळे जीवनात यशस्वी झालेल्यांशी संपर्क होऊन स्वतःचा उद्योग व्यवसाय निर्माण करण्याची क्षमता – आवड विद्यार्थ्यांमध्ये निर्माण होऊ शकेल.
7	MAR-III.C-5	काव्यशास्त्र (भारतीय व पाश्चात्य)	1. काव्य या साहित्यप्रकाराची विद्यार्थ्यांना ओळख होईल त्याचबरोबर एक शास्त्र म्हणून काव्यशास्त्राची बाजू ध्यानात येईल. 2. प्राचीन काव्यापासून म्हणजे संस्कृत साहित्यातील काव्यलक्षणे व पाश्चात्य साहित्यातील काव्यलक्षणे समजल्यामुळे, एकूणच काव्यशास्त्राचा सखोल अभ्यास होईल. 3. काव्यनिर्मितीकडे, प्राचीन भारतीय साहित्याभ्यासकांनी आणि पाश्यात्य साहित्याभ्यासकांनी कोणकोणत्या हेतूने पाहिले आणि काव्यनिर्मितीची कोणकोणती प्रयोजने होती त्याचा सविस्तर अभ्यास होईल. 4. काव्यनिर्मितीत प्रतिभेचा महत्त्वाचा परिचय होईल. 5. काव्याकडे पाहण्याची एक समीक्षात्मक, विश्लेषणात्मकदृष्टी प्राप्त होईल.

8	MAR-III.E-1	प्राचीन मराठी वाङ्मय (प्रारंभ – 1650)	1. भाषिक/ऐतिहासिक दृष्टीने साहित्याचा अभ्यास करणे शक्य होईल. 2. साहित्यप्रकारानुसार अभ्यासाची दिशा प्राप्त होईल. 3. वाङ्मयाचे परीक्षण व समीक्षण करणे शक्य होईल. 4. परीक्षण /समीक्षण / तुलनात्मक अभ्यास यातून अर्थलाभ होईल.
9	MAR-III.E-2	मराठी ललित गद्य स्वरूप आणि उपयोजन	1. ललित गद्य या वाङ्मयप्रकाराची ओळख होईल व वाचनाची आवड निर्माण होईल. 2. सैध्दांतिक व उपयोजित स्तरावर ललित गद्याचे अध्ययन केल्यामुळे ललित गद्याची लेखन क्षमता विद्यार्थ्यांमध्ये निर्माण होईल. 3. विविध नियतकालिकांतून ललित गद्य प्रसिद्ध होईल. 4. फावल्या वेळात लेखनाचा छंद जोपासून अर्थप्राप्ती होईल.
10	MAR-III.E-3	साहित्याभिरूचीचे स्वरूप	1. वैयक्तिक पातळीवर आणि कौटुंबिक किंवा सामाजिक पातळीवरील वाचन संस्कृती विकसित होण्यास हातभार लागेल. 2. वाचनसंस्कृतीतून घरोघरी ग्रंथ संपदा वाढीस लागेल. 3. वैयक्तिक पातळीवरील नेत्तृत्व गुणांची जोपासना करण्याबरोबरच सामाजिक पातळीवरील साहित्यविषयक उपक्रमशिलता वाढीस लागेल. 4. साहित्यविषयक चर्चासत्रे/परिसंवाद/ग्रंथ प्रदर्शने/मेळावे यांचे व्यावसायिकदृष्ट्या आयोजन करणे शक्य होईल.
11	MAR-III.E-4	गोमंतकीय मराठी साहित्य: समीक्षा आणि संशोधन (कविता, कथा, कादंबरी, बालसाहित्य)	1. गोमंतकीय मराठी साहित्याची/साहित्यप्रकाराची विद्यार्थ्यांना ओळख होईल. 2. गोमंतकीय मराठी साहित्याचे कोणकोणत्याप्रकारे विकसन झाले, स्थित्यंतरे झाली त्याचा स्थूल परिचय विद्यार्थ्यांना होऊ शकेल. 3. वाचलेल्या गोमंतकीय मराठी साहित्यावर/पुस्तकांवर विविध मराठी वृत्तपत्रांतून, नियतकालिकांतून विद्यार्थ्यांना समीक्षणे लिहिता येतील. 4. साहित्याच्या संशोधन पद्धतीनुसार एखाद्या साहित्य प्रकारातील गोमंतकीय साहित्यावर वा पुस्तकावर लघुशोधनिबंध वा लघुप्रकल्पकार्य तयार करून घेता येतील. विविध योजनांतून अनुदान प्राप्ती होऊ शकेल.
12	MAR-IV.C-6	रसविचार आणि समीक्षाविचार	1. रसविचार समजावून घेतल्याने समीक्षेसाठी आवश्यक ती दृष्टी येईल. 2. साहित्याच्या सौंदर्यातील रसविचाराचे महत्त्व ध्यानात आल्याने अभ्यास / अध्ययनदृष्टी विकसित होईल. 3. समीक्षेतील आधुनिक प्रवाह समजून घेता येतील.

			4. निवडलेल्या वाङ्मयप्रकारातील एखाद्या ग्रंथाचे समग्र मूल्यमापन स्वतंत्र निबंधाद्वारे वा ग्रांथिकेद्वारे करणे शक्य होईल.
13	MAR-IV.E-5	प्राचीन मराठी वाङ्मय (1651- 1818)	1. भाषिक/ऐतिहासिक दृष्टीने साहित्याचा अभ्यास करणे शक्य होईल. 2. साहित्यप्रकारानुसार अभ्यासाची दिशा प्राप्त होईल. 3. वाङ्मयाचे परीक्षण व समीक्षण करणे शक्य होईल. 4. परीक्षण /समीक्षण / तुलनात्मक अभ्यास यातून अर्थलाभ होईल.
14	MAR-IV.E-6	प्रवासवर्णनः एक अभ्यास	1. प्रवासवर्णनपर साहित्याच्या वाचनाची आणि लेखनाची आवड निर्माण होईल. 2. नियतकालिकातून प्रवासवर्णनपर लेखनाची आवड निर्माण होईल. 3. प्रवासवर्णनाचे परीक्षण / समीक्षण करता येईल. 4. प्रवासवर्णने लिहिता येईल/ संपादकीय संस्कार करता येतील.
15	MAR-IV.E-7	कार्यक्रम संयोजन व संचालन कौशल्य	1. या क्षेत्रामध्ये रोजगाराची संधी उपलब्ध होईल. 2. स्वयंरोजगाराच्या दृष्टीने या दोन्ही प्रकारांचे महत्त्व पटवून देणे. 3. वैयक्तिक पातळीवरील नेतृत्व गुणांची जोपासना करण्याबरोबरच सामाजिक पातळीवरील साहित्यविषयक उपक्रमशिलता वाढीस लागेल.
16	MAR-IV.E-8	गोमंतक आणि कोकण या प्रदेशातील लोककला	1. लोककलांच्या परिचयातून लोकसाहित्याचा अभ्यास होईल. 2. गोमंतकीय लोककलांच्या परिचया बरोबरच त्यांचा अभ्यास करणे शक्य होईल. 3. कोकणातील लोककलांचा परिचय होईल. 4. गोमंतक आणि कोकणातील लोककलांत आढळणारे साम्यभेद शोधण्यातून सांस्कृतिक अनुबंध निर्माण होईल. 5. व्यावसायिकदृष्ट्या लोककलांचे दिग्दर्शन / आयोजन करून अर्थलाभ होऊ शकेल.
17	MAR-V.C-7	व्याकरण	1. व्याकरण या विषयाची विद्यार्थ्यांना स्वतंत्रपणे ओळख होईल. 2. मराठी व्याकरणाची परंपरा समजू शकेल. 3. व्यावहारिक लेखन, प्रसारमाध्यमांसाठींचे लेखन व्याकरणविषयक नियमांनी करणे शक्य होईल. 4. व्याकरणाच्या अभ्यासामुळे ग्रंथ लेखन, कार्यालयीन लेखन, माध्यमांसाठीचे लेखन इ. रोजगाराची संधी

			मिळेल.
18	MAR-V.E-9	मराठी वाङ्मयाचे सांस्कृतिक स्वरूप	1. समाजाच्या विकासामध्ये साहित्य आणि संस्कृती यांच्यातील स्थित्यंतरे कशी कारणीभूत ठरतात यांचा विद्यार्थींना परिचय होईल. 2. इंग्रजांच्या आगमनामुळे साहित्य आणि समाज यांच्यावर झालेले परिणाम समजून घेता येतील. 3. समाजिक आणि सांस्कृतिक क्षेत्रात आवड निर्माण होईल. 4. समाजिक आणि सांस्कृतिक क्षेत्रात कार्य करणाऱ्या संस्थातून रोजगार संधी.
19	MAR-V.E-10	आत्मचरित्रः साहित्यप्रकार आणि उपयोजन	1. आत्मचरित्रपर साहित्याच्या वाचनाची आणि लेखनाची गोडी विद्यार्थींच्या मनात निर्माण होईल. 2. नियतकालिके आणि प्रसारमाध्यमांसाठी आत्मपर लेखन करता येईल. 3. आत्मचरित्रपर साहित्याचे विविध माध्यमांतून परीक्षण करणे शक्य होईल. 4. आत्मचरित्र लिहून घेता येईल. संपादकीय संस्कार करता येईल.
20	MAR-V.E-11	पत्रकारिताः स्वरूप आणि कौशल्ये	1. पत्रकारितेतील लेखनकौशल्यांचा परिचय होईल. 2. विविध प्रसारमाध्यमांतून लेखन करता येईल. 3. स्वतःचे साप्ताहिक / मासिक काढणे शक्य होईल. 4. विविध प्रसारमाध्यमात पत्रकार व संपादक म्हणून रोजगार संधी.
21	MAR-V.E-12	भाषिक कौशल्ये आणि व्यक्तिमत्त्व विकास	1. विविध भाषिक कौशल्यांमुळे व्यक्तिमत्त्वाचा विकास होईल. 2. समाजाचे प्रश्न समजावून घेऊन त्यावर लेखन करता येईल. 3. विविध स्पर्धा परीक्षांना बसता येईल. 4. प्रशासकीय क्षेत्रात नोकरीची संधी उपलब्ध होईल.
22	MAR-V ID-1	मराठी पथनाट्यः स्वरुप व सादरीकरण	1. पथनाट्य या नाट्यप्रकाराची एक वाङमयप्रकार व कलाप्रकार म्हणून ओळख होईल. 2. पथनाट्याचे लेखन करता येईल. 3. पथनाट्य सादरीकरण करता येईल. 4. या नाट्यप्रकाराचे मूल्यमापन करण्याची क्षमता निर्माण होईल. 5. नाटक लेखनाची आवड निर्माण होईल.

23	**MAR-VI.C-8**	भाषाविज्ञान	1. भाषेकडे वैज्ञानिक दृष्टीने पहाणे शक्य होईल. 2. भाषांचा तुलनात्मक अभ्यास करता येईल. 3. शब्दकोश तयार करता येतील. 4. भाषाभ्यास करणाऱ्या संस्थातून नोकरीची संधी उपलब्ध होईल.
24	MAR-VI.E-13	मुक्तीपूर्व गोमंतकीय मराठी वाङमय	1. भाषिक, ऐतिहासिक दृष्टीने साहित्याचा अभ्यास करणे शक्य होईल. 2. साहित्यप्रकारानुसार अभ्यासाची दिशा प्राप्त होईल. 3. वाङ्मयाचे परीक्षण व संशोधनपर भूमिका तयार होईल. 4. साहित्याचे मूल्यमापन व समीक्षण यातून अर्थप्राप्ती होईल.
25	MAR-VI.E-14	मराठी प्रादेशिक कादंबरीः स्वरूप आणि उपयोजन	1.प्रादेशिक कादंबरी या साहित्यप्रवाहाची ओळख होईल. 2. सैध्दांतिक व उपयोजित स्तरावर प्रादेशिक कादंबरीचे अध्ययन केल्यामुळे या लेखनप्रकाराचे मूल्यमापन करण्याची क्षमता विद्यार्थ्यांमध्ये निर्माण होईल. 3. प्रदेशविशिष्ट साहित्य लेखन करता येईल. 4. समीक्षा, मूल्यमापन इ. अर्थप्राप्ती होऊ शकेल.
26	MAR-VI.E-15	भाषांतर विद्या	1.भाषांतराची आजच्या काळातील उपयुक्तता विद्यार्थ्यांच्या ध्यानात येईल. 2. भाषांतरप्रक्रिया समजावून घेता येईल. 3. विविध साहित्यप्रकारांची भाषांतरे नियतकालिकांसाठी करता येईल. 4. ग्रंथांची भाषांतरे करण्यामुळे आर्थिक लाभ होईल. 5. भाषांतरकार म्हणून रोजगारसंधी निर्माण होईल.
27	MAR-VI.E-16	माहितीपट (डॉक्युमेंटरी): लेखन आणि उपयोजन	1. माहितीपटाचे स्वरूप अभ्यासल्यामुळे एक व्यावसायिक कौशल्य विकसित होईल. 2. माहितीपटाच्या अभ्यासामुळे पुढील पटकथा वा चित्रपटकथा लेखनाची प्राथमिक तयारी होऊ शकेल. 3. चित्रिकरण प्रक्रियेचा परिचय होऊ शकेल. 4. प्रसारमाध्यमे आणि जनसंपर्क क्षेत्रात रोजगाराची संधी.
28	MAR-VI.ID-2	मराठी एकांकिका: स्वरुप व सादरीकरण	1. एकांकिका या नाट्यप्रकाराची एक वाङमयप्रकार व कलाप्रकार म्हणून ओळख होईल. 2. एकांकिकेचे लेखन करता येईल. 3. एकांकिकेचे सादरीकरण करता येईल.

			4. या नाट्यप्रकाराचे मूल्यमापन करण्याची क्षमता निर्माण होईल. 5. नाटक लेखनाची आवड निर्माण होईल.
29	FC-MAR-I.1	मराठी वाचन, लेखन आणि संभाषण कौशल्य	1. वाचनकौशल्यातून लेखनकौशल्य विकसित होईल. 2. विविध माध्यमांसाठी लेखन करता येईल. 3. वाचन, लेखन, संभाषणामुळे व्यक्तिमत्त्व चतुरस्त्र होईल. 4. रोजगारक्षम गुणांचे विकसन होईल.

PROGRAMME BSC ZOOLOGY

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life- professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development at local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) Graduate of programme of BSc Zoology should have developed high level of proficiency in:		
PSO1	Sound subject knowledge	Have strong foundation of fundamentals and modern concepts of Zoology.
PSO2	Good practical procedure skills	Formulate plan of procedure and execute research plan and collect, collate, analyse and interpret data.
PSO3	Bio- Entrepreneur	Being able to make a business plan to pursue career in Fishery / Wildlife / paramedical or research sector or start business enterprise related to aspects of zoology.
PSO4	Critical thinking and Problem solving skills	Assess, analyse and argue critically, real life problems or issues in areas/fields of zoology and apply proper logical strategies to find a solution.
PSO5	Leadership quality	Demonstrate leadership quality and be able to function well as an individual or in a team.

COURSE OUTCOMES (COs)

SEMESTER	COURSE CODE	COURSE TITLE	COURSE OUTCOME: Upon successful completion of the course, students will be able to:
I	ZOO-I.C-1	Animal Diversity : Non Chordates	CO1: Be familiar with identification of the non-chordates from chordates. CO2: Identify the invertebrates and classify them upto the class level. CO3: Understand the basis of life processes in the non-chordates. CO4: Able to appreciate the process of evolution and understand how it progressed from simple, unicellular cells to complex, multicellular organisms.
I	ZOO-I.C-2	Cell and Molecular Biology	CO1: Have an understanding of cell, it's organelles and their function. CO2: Demonstrate deeper understanding of what 'life is and how it functions at cellular level. CO3: Contrast cellular membrane structure and function, fine structure and function of cell organelles. CO4: Perform a variety of molecular and cellular biology techniques.
II	ZOO-II.C-3	Diversity and Biological Systems of Chordates	CO1: Be familiar with identification of the non-chordates from chordates with justification. CO2: Identify the different chordates upto the order. CO3: Understand the functioning and mechanism of the various biological systems in the chordates. CO4: Able to appreciate the process of evolution of chordates from nonchordates and understand how it progressed from simple vertebrates to highly complex vertebrates.
II	ZOO-II.C-4	Fundamentals of Animal and Human Genetics	CO1: Describe the basic structure of genes and chromosomes. CO2: Relate an organism's genotype and phenotype and explain the role of genes in inheritance. CO3: Associate knowledge of genetic principles to the phenomena which occur in humans with reference to genetic inheritance. CO4: Construct and analyze pedigrees to determine mode of inheritance of disorders and traits.
III	ZOO-III.C-5	Human Physiology	CO1: Describe and explain the normal function of the cells, tissues, organs, and organ systems of the human body. CO2: Develop understanding of the functional relationships of anatomical structures to one another. CO3: Know the disorders associated with the different systems. CO4: Understand and associate malfunctions in the body to various organs and organ systems.
IV	ZOO-IV.C-6	Biochemistry and Metabolic Regulation	CO1: Understand better the chemical basis in life. CO2: Know the basic principles that govern the functioning of living systems CO3: Be familiar with enzymes and their activities CO4: Appreciate better the interactions between the biological molecules.
V	ZOO-V.C-7	Developmental Biology	CO1: Understand the basic plan of animal development. CO2: Know the processes which occur during the course of development in invertebrates and vertebrates. CO3: Have the basic knowledge of developmental biology. CO4: Know the concepts associated with development of embryo.
VI	ZOO-VI.C-8	Wildlife	CO1: Apply the techniques used in assessment and monitoring

SEMESTER	COURSE CODE	COURSE TITLE	COURSE OUTCOME: Upon successful completion of the course, students will be able to:
		Biology	of wildlife. CO2: Understand the basics of wildlife status, conservation, assessment and management. CO3: Know about the diversity, extent, range of wildlife population dynamics. CO4: Know the rules, regulations and factors governing wildlife.
III	**ZOO-III.E-1**	Vertebrate Endocrinology	CO1: Be familiar with all the endocrine organs of human body. CO2: Associate hormones to body growth, metabolism, reproduction and development. CO3: To understand the underlying principles and disorders associated with hormone functions CO4: Learn techniques of histology and tissue identification.
III	**ZOO-III.E-2**	Basic microbiology and Fundamentals of Animal Biotechnology	CO1: Gain working knowledge of basic bacterial laboratory techniques and use of microorganism in biotechnology. CO2: Perform techniques of bacterial isolation and identification. CO3: Have knowledge about various molecular techniques of gene manipulation. CO4: Should be able to Perform techniques of isolate DNA, bring about transformation and identification of recombinants.
III	**ZOO-III.E-3**	Environmental Toxicology	CO1: Distinguish, classify and characterize a variety of environmental pollutants based on their biological and physical properties. CO2: Identify the main sources and types of environmental pollutants and assess their potential environmental fate. CO3: Understand mechanisms of detoxification of various varieties of toxicants. CO4: Know the procedures/protocols used to assess physicochemical parameters and environmental contaminants.
III	**ZOO-III.E-4 / *ZOO-III-SEC-1**	Waste management techniques	CO1: Understand concept of types of waste,its transport and disposal. CO2: Perform composting techniques / procedures. CO3: Identify means of reducing waste production. CO4: Plan and conduct research in areas of waste management
IV	**ZOO-IV.E-5**	Animal cell culture and Applications	CO1: Operate, calibrate, and maintain standard equipment found in an animal cell culture laboratory; CO2: Prepare and sterilize media and solutions used in cell culture. CO3: Understand concepts and applications of mammalian cell culture. CO4: Perform primary cell culture of suspension and adherent cells.
IV	**ZOO-IV.E-6**	Aquaculture and Fisheries	CO1: Understand conservation and sustainability of aquaculture resources. CO2: Acquainted with various techniques of aquaculture. CO3: Know strategies of improving the social and economic benefits derived from aquaculture and fisheries. CO4: Initiate business enterprise in area of aquaculture.
IV	**ZOO-IV.E-7**	Immunology	CO1: Understand the components of the immune system and their function. CO2: Explain the mechanisms of immune response. CO3: Know about the techniques used in detecting immunological diagnosis. CO4: Perform immunoassays for disease detection.

SEMESTER	COURSE CODE	COURSE TITLE	**COURSE OUTCOME:** Upon successful completion of the course, students will be able to:
IV	**ZOO-IV.E-8**	Parasitology	CO1: Know about the parasites and their lifecycles. CO2: Get acquainted with dimensions of public health viz . a viz. parasitic diversity, epidemiology and community prophylaxis. CO3: Be familiar with the parasite host interactions. CO4: Gain knowledge on diagnosis of parasite infections and preventive measures.
V	**ZOO-V.E-9**	Molecular Genetics and Forensic Science	CO1: Understand and explain the process of replication, transcription and translation CO2: Differentiate between the gene expression in prokaryotes and eukaryotes CO3: Understand the Branches of forensic science CO4: know the application of molecular tools in genetic diagnosis
V	**ZOO-V.E-10**	Economic Zoology	CO1: Understand how zoological species contribute to economic sources. CO2: Gain working knowledge of techniques of rearing organisms. CO3: Get acquainted with maintenance of the species CO4: Understand the underlying principles of harvesting products from species.
V	**ZOO-V.E-11**	Basic and Applied Entomology	CO1: Be familiar with the identification of bio economical species. CO2: Identify entrepreneurial opportunities in entomology. CO3: Important insects and their products. CO4: Insect pests of public health and veterinary importance and their management.
V	**ZOO-V.E-12**	Fish Preservation and Processing	CO1: gain understanding of the economic benefits of fishes. CO2: They will also be able to understand the nutritional values of the fishes CO3: Perform some protocols of Fish processing and preservation. CO4: Aquaint oneself with the processes at fish processing industry
VI	**ZOO-VI.E-13/ *ZOO-VI-GE-1**	Health and Nutrition	CO1: Know about nutrients and their function CO2: Read and interprete food labels. CO3: Correlate role of lifestyle and food habits in causing diseases. CO4: Prepare Diet Plans for different age group individuals.
VI	**ZOO-VI.E-14**	Ecology and Ethology	CO1: gain better understanding of concepts of ecology. CO2: Acquainted with the basics of animal behaviours CO3: Know strategies of biodiversity conservation, CO4: Understand mechanisms of sustainable development.
VI	**ZOO-VI.E-15**	Laboratory Techniques in Pathology	CO1: Perform basic techniques of cell/tissue processing CO2: Be Familiar with procedures of tests done for disease detection CO3: Process various body fluids and tissues for disease detection.. CO4: Understand the clinical implication of the pathological tests.
VI	**ZOO-VI.E-16 / *ZOO-VI-SE-2**	Bio Entrepreneurship	CO1: understand concept of business Proposals CO2: familiar with the methodologies and regulations required to start an enterprise CO3: Identify opportunities available in life science for start-ups. CO4: Generate Ideas and initiate a Business Plan.

***

B.A. in Psychology

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily life- professional and personal.
PO-3	Environment and Sustainability	Be aware of environmental issues and commit towards sustainable development atlocal/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) of Department of Psychology After successful completion of a Bachelor's degree in Psychology, the students will:		
PSO-1	Testing	Assist in reliability and validity processes of test construction.
PSO-2	Experimentation	Conceptualize and design an experiment in psychology.
PSO-3	Application of knowledge	Generate culturally appropriate solutions to psychosocial problems encountered in real world settings
PSO-4	Cognitive Skills	Demonstrate reasonable scepticism and intellectual curiosity by asking questions about causes of behaviour

PSO - 5	Self-improvement	Demonstrate the application of psychological principles to promote self-improvement

Course Outcomes

Sr. No	Course Code	Course Title	Course Outcomes
1.	PSY-I.C-1 (Non-experimental)	**BASIC COURSE IN PSYCHOLOGY**	CO1. Distinguish between various schools of psychology. CO2.Describe the functioning of the nervous system. CO3. Use various techniques to improve memory. CO4. Analyze the influence of motives on behavior. CO5.Apply learning theories to modify behavior.
2.	PSY-I.C-2 (Experimental – Theory)	**EMOTIONAL DEVELOPMENT**	CO 1.Differentiate between moods and emotions. CO 2.Describe the process involved in the experience of emotions CO 3.Categorize people according to their temperamental CO 4.Extrapolate how attachment between a parent and child can influence future relationships of the child CO 5.Describe the importance of emotional intelligence.
3.	PSY-II.C-3 (Non-experimental)	**Personality Theories**	CO 1.To explain personality development through various theoretical perspectives. CO 2.To highlight the importance of personality development. CO 3.To Distinguish between various personality theories. CO 4To identify one's own personality traits.

			CO 5.To critically evaluate different personality theories.
4.	PSY-II.C-4 (Experimental: Theory)	**BASICS OF COUNSELLING**	CO1. List out personal Characteristics of Effective Counsellors CO2.Describe the stages involved in Counselling process CO3. Highlight important elements of establishing an alliance between Counsellor and Counselee CO4. Identify transference and countertransference in a therapeutic alliance CO5. Compare person centered and cognitive behaviour approaches of Counselling CO6. Identify various areas of counselling
5.	PSY-V.C-7 (Experimental-Theory)	**EXPERIMENTAL PSYCHOLOGY**	CO1.Identify the variables of an experiment CO2. Design an experiment having one or two variables CO3.Weigh methods of subject selection from subject populations CO4. Examine the criteria for selecting stimuli from stimulus population. CO5 Select the statistical test to be used for the given experimental research CO6. Analyse and minimize/avoid pitfalls in experiments
6.	PSY-III.E-2 (Non-	**CHILD**	CO1.Describe prenatal

	experimental)	**PSYCHOLOGY**	development CO2. List out the precautions during pregnancy CO3. Highlight the important aspects of cognitive development in children CO4. Identify effective strategies to boost self-esteem in children CO5. Describe effective parenting styles CO6. Analyze the effect of different family dynamics on development of children.
7.	PSY-III.E-4(Non-experimental)	SPORTS PSYCHOLOGY	CO1. Apply the principles of psychology in sports. CO2. Defend the use of healthy aggression in sporting scenarios. CO3. Differentiate between intrinsic and extrinsic motivation in sports. CO4. Identify the source of motivation for a sportsperson. CO5. Explain the importance of goal-setting in sports. CO6. Manage conflicts among teams.
8.	PSY-III.E-3 (Non-experimental)	**INTERPERSONAL RELATIONSHIPS**	CO1. Apply different theoretical perspectives to understand interpersonal relationships CO2. Identify factors determining relationship formation. CO3. Examine the effects of relationship on various aspects of life. CO4. Identify ways to prevent dissolutions of relationships.

			CO5. Suggest ways to dissolve relationships in a healthy manner. CO6. Examine variations in relationships.
9.	PSY-III.E-17 (Non-experimental)	**BIOLOGICAL BASIS OF BEHAVIOUR**	CO1. Describe how genes influence behaviour and cause individual differences. CO2. Explain the impact of endocrine system on behaviour. CO3. Explain functioning of the nervous system. CO4. Relate the link between perception and sensation across different sensory systems. CO5. Examine different states/levels of consciousness.
10.	PSY-VI.C-8 (Experimental)	**PSYCHOLOGICAL TESTING**	CO1. Describe the characteristics, and user guidelines of a psychological test. CO2. Explain the importance and types of norms in testing. CO3. Describe the essential components (reliability and validity) of a psychological test. CO4. Enumerate estimates of reliability. CO5. Enlist types of validity in testing. CO6. Critically evaluate the scientific soundness of a psychological test.
11.	PSY-IV.E-7 (Non-experimental)	**Psychology of Adolescence**	CO1. Compare various theoretical perspectives of adolescence CO2. Describe the psychological dimensions of puberty

			CO3. Critically evaluate the role of society/culture in identity development in adolescents CO4. Prepare a plan for health awareness among adolescence CO5. Conceptualize ways to deal with various socio-emotional and other issues faced by adolescents.
12.	PSY-IV.E-6 (Non-experimental)	**CRIMINAL PSYCHOLOGY**	CO1. Explain the different approaches to criminal behaviour. CO2. Describe the type of violence in schools, community, and in families. CO3. Enumerate the characteristics of sexual offenders. CO4. Propose techniques to prevent crime in various settings. CO5. Evaluate the use of punishment as a deterrent to criminal activity. CO6. Propose techniques to rehabilitate criminals.
13.	PSY-IV.E-5 (Non-Experimental)	**PSYCHOLOGY OF ADJUSTMENT**	CO1. Identify the elements of a fully functioning person. CO2. Describe how individuals in a family adjust to changes & respond to challenges. CO3. Analyze the sources of marital conflict and use appropriate resolving techniques. CO4. Examine the relationship between work and psychological adjustment.

			CO5. Analyze how different areas of adjustment are interrelated
14.	PSY-V.E-9 (Non-experimental)	**COGNITIVE PSYCHOLOGY**	CO1. Explain the various paradigms of cognitive psychology. CO2. Distinguish between bottom-up and top-down processes in perception. CO3. Demonstrate how we acquire, store, transform and use knowledge. CO4. Apply the concepts of perception, attention and concept formation in daily activities. CO5. To map the link between various cognitive processes.
15.	PSY-III.C-5 (Experimental - theory)	**PSYCHOPATHOLOGY I**	CO1. To impart knowledge and understanding of the basic concepts in Abnormal CO2. Psychology and the theories about Abnormality CO3. To know the historical development of the study of abnormal behaviour, criteria and perspectives in abnormal behaviour and common classification systems, CO4. To create awareness about Mental Health problems in society CO5. To create a foundation for higher education and for a career in Clinical Psychology.
16.	PSY-V.E-12	**PSYCHOLOGY OF ADULTHOOD**	CO1. Analyze the progression of physical development from young to middle adulthood. CO2. Describe the process of moral development in young adulthood. CO3 Relate various theories of

			personality development to young adulthood. CO4 Describe the various types of psychosocial issues that arise in marital and non-marital relationships. CO5. Relate the decline in cognitive abilities to changes in daily functioning during middle adulthood. CO6. Analyze the impact of evolving relationships on psychosocial adjustment in middle adulthood.
17.	PSY-IV.E-8 (Non-experimental)	**POSITIVE PSYCHOLOGY**	CO1. Describe the methods used to study well-being CO2. Compare Hedonic and Eudaimonic Views of Happiness CO3. Identify sources of resilience for children, adolescence and adults available in the society CO4. Identify determinants of happiness in the Indian culture CO5. Evaluate the role of money in the context of positive psychology
18.	PSY-V.E-11	**ENVIRONMENTAL PSYCHOLOGY**	CO1. Describe the human - environmental relationship CO2. Compare and contrast the theories of environment behaviour relationship. CO3.Analyse the environmental influences on human behaviour. CO4. Defend the role of an environmental psychologist in bringing about a positive change in the environment CO5.Propose pro-environmental behaviours in the

			Indian setting.
19.	PSY-VI.E-15	**NEUROPSYCHOLOGY I**	CO1. To explain the process of neural conduction and synaptic transmission CO2. To Describe the development of the nervous system. CO3. To describe the organization, structure, and function of the human central nervous system. CO4. To explain the effects of sleep deprivation and sleepdisorders CO5. To explain the role of biopsychology in psychiatric disorders.
20.	PSY-IV.C-6 (Experimental-Theory)	**PSYCHOPATHOLOGY II**	CO1 Identify mental disorders based on the symptoms. CO2. Differentiate between personality disorders and schizophrenia. CO3. Distinguish between sexual deviance and sexual disorders. CO4. Identify appropriate treatment intervention for mental disorders. CO5. Critically evaluate the portrayal of mental disorders in mainstream media.
21.	PSY-VI.E-13 (Non-experimental)	**GERONTOLOGY**	CO1. Explain the concept of ageing from different cultural perspectives CO2. Describe the concept of ageing from different theoretical perspectives CO3. Analyze the need for old age homes CO4. Describe challenges faced by elderly today CO5. Prepare a proposal for

			empowering the aged people
22.	PSY-VI.E-14	**ORGANIZATIONAL BEHAVIOR**	CO1. Underline the relevance of studying organisational behaviour CO2. Evaluate the various theories of motivation at workplace. CO3. Analyse team situations and adopt appropriate leadership behaviour for them. CO4. Identify the nature and sources of conflict. CO5. Implement effective conflict management strategies in real world settings
23.	PSY-V. E-16	**CROSS-CULTURAL PSYCHOLOGY**	CO1. Explain the relevance of cross-cultural psychology. CO2. Evaluate ethnocentrism in applicability of research findings to Indian populations. CO3. Analyse the impact of globalization on cultural transmission. CO4. Defend personal opinions on individualistic/collectivistic ways of living. CO5. Draw parallels in personality development, emotional expression and language development across cultures. CO6. Explain how cultures can define psychopathologies. CO7. Underline the importance of culture in fostering healthy behaviours.
24.	PSY-VI.E-18	**NEUROPSYCHOLOGY II**	CO1.To describe Neuroplastic property of the brain in the face of brain damage. CO2. To apply the phenomena of split brain to the study of personality.

			CO3. To examine the role of the nervous system in the development of learning disorders. CO4. To describe the functioning of the nervous system in drug addicts CO5. To explain the brain reward circuit and its role in addiction CO6. To explain various research methods used to study structure and functions of the brain.
25.	PSY-INT-1 (Non-experimental)	**BUSINESS PSYCHOLOGY**	CO1. Apply theories of motivation to the workplace. CO2. Explain how communication at work can be improved. CO3. Describe the processes of negotiation and decision making. CO4. Explain how job satisfaction can be enhanced. CO5. Differentiate between leadership and management. CO6. Enumerate human resources practices that can increase work productivity. CO7. Identify stressors and propose stress management techniques at work.
26.	PSY-INT-2(Non-experimental)	SPORTS PSYCHOLOGY	CO1. Apply the principles of psychology in sports. CO2. Defend the use of healthy aggression in sporting scenarios. CO3. Differentiate between intrinsic and extrinsic motivation in sports. CO4. Identify the source of motivation for a sportsperson. CO5. Explain the importance of

			goal-setting in sports. CO6. Manage conflicts among teams.
27.	PSY-V.E-11	**ENVIRONMENTAL PSYCHOLOGY**	CO1. Describe the human - environmental relationship CO2. Compare and contrast the theories of environment behaviour relationship. CO3. Analyse the environmental influences on human behaviour. CO4. Defend the role of an environmental psychologist in bringing about a positive change in the environment CO5. Propose pro-environmental behaviours in the Indian setting.

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in Sociology, the students will:		
PSO-1	Sociological Perspective	Employ a Sociological Perspective in the critical Analyses of Varied aspects: Society, Change, Progress and Development learned the works of Western and Indian pioneers.
PSO-2	Cultural Understanding and appreciation	Understand, Appraise and Demonstrate the evolution of Goan and Indian Culture and appreciate the same.
PSO-3	Use of Digital Technology	Demonstrate the use of digital technology in narrating any sociological phenomena using sociological perspective
PSO-4	Research Aptitude	Apply the methods of Qualitative Research in planning, designing and execution of a Research Project
PSO-5	Social Work	Design and establish areas of Social Work i.e. NGO'S, Women Empowerment, Social issues and Social Welfare (Rural and Urban)
PSO-6	Educational Practice	Critically evaluate the issues arising in the contemporary system of education in India and demonstrate varied teaching-learning pedagogies to deal with the classroom thereby creating a foundation in Teaching as a profession

Programme Outcome (PO) and Course Outcome (CO)

Name of the Department MASTER OF ARTS IN GEOGRAPHY

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.

Program specific outcomes (PSO)

After successful completion of a Master's degree in Geography, the student will:

Program outcome(PO)	**Short Title of PSOs**	**Description of the program outcomes**
PSO 1	Map Skills	Students will be able to read, interpret and generate maps and other cartographic representations from temporal and spatial perspectives.
PSO2	Fundamentals of Geography	Students will be able to understand fundamentals of geography (physical, human and regional) in general and apply in specialized domains of geography.
PSO3	Research Skills	Students will be able to present completed research including review of literature, methodology and discussion and utilize cartographic tools and other visual formats both orally and in written formats.
PSO4	Practical Skills	Students will be able to understand various theoretical and methodological approaches, including quantitative as well as qualitative data in physical and human geography through practical, fieldworks and presentations.

S.N.	Course Code	Course Title	Course Outcomes
1	PG.GEG.C1	Advanced Geomorphology	CO1: Understand the dynamics of the physical geography including the origin of the Earth and its evolution through geologic time and related topographic ad structural evolution. CO2: Understand and explain how the endogenous and exogenous processes shape landforms and distinguish the mechanisms that control these processes. CO3: Analyze the relationship between folding, faulting, volcanic activity and plate tectonics. CO4: Outline the early development of geomorphology and the people involved with its development. CO5: Understand how different scales of time and space affect geomorphological processes. CO6: Differentiate between the general degradational processes of rock weathering and their effects on landforms. CO7: Describe the morphology and evolution of landscapes and related processes in areas influenced by fluvial, glacial, periglacial, aeolian, karst, and coastal systems. CO8: Understand landform development by various theories. Analyze geomorphological issues at global, regional and local scale and application of geomorphology to solve realistic problems
2	PG.GEG.C2	Advanced Climatology	CO1: Develop basic knowledge of atmospheric weather and climate and the structure of the atmosphere. CO2: Understand and explain how temperature, pressure, humidity and wind motion vary in time and space and their effect on weather. CO3: Knowledge about meteorological observations and measurements. CO4: Describe climatic diversity over the Earth and knowledge of the climatic zones. CO5: Describe the global circulation of the atmosphere, frontal systems and atmospheric motions. CO6: Ability to perform climatological analysis on the basis of meteorological data.
3	PG.GEG.C3	Practical in Geomorphology and Climatology	CO1: Understand Geomorphic data and its importance CO2: Create different types of thematic maps and

			interpreting the results. CO3: Apply different statistical methods used in geomorphological data. CO4: Understand and apply geomorphic signs and symbols and to understand geomorphic pattern on field. CO5: Use geomorphologic data to communicate effectively by creating graphs and charts. CO6: Understand the importance of climatic data in day to day life. CO7: Apply statistical data in a given climatic datasets. CO8: Understand and analyze the relationship between different climatic data like rainfall & temperature, height & temperature, Normal lapse rate & Dry adiabatic rate. CO9: Create results and graphs; and build up their interdependence. CO10: Use climatic data to communicate effectively by creating graphs and charts.
4	PG.GEG.E1	Introduction to Tourism	CO1: At the end of this course students are expected to have a holistic understanding of fundamental concepts of tourism and tourist resources in India and thereby be able to analyze the interrelationships among them. CO2: Students will be able to demonstrate an awareness and sensitivity to retail and tourism management operations in an international marketplace. CO3: Demonstrate the ability to critically evaluate and compare diverse perspectives in the retailing and tourism management industry.
5	PG.GEG.E2	Rural Studies	CO1: Apply their knowledge and understanding, and problem-solving abilities, to independently identify rural development issues from a geographical perspective. CO2: Demonstrate an ability to critically and systematically integrate knowledge, to analyze and assess complex phenomena and issues in the fields of rural development. CO3: Identify and analyze specific urban and rural development needs; and demonstrate an ability to clearly present and discuss conclusions, and the arguments, orally and in writing.
6	PG.GEG.E3	Geography of Environment	CO1: Understand human-environment interactions and environmental problems – their causes, effects and remedies.

			CO2: Evaluate the impacts of human activities on natural environments with special reference to India. CO3: Understand environmental hazards and management. CO4: Show awareness and responsibility towards the environment.
7	PG.GEG.E4	Advanced Regional Geography	CO1: Students will be able to comprehend the global trends and their relation to the physical and socio-economic issues.
8	PG.GEG.C4	Geography of Population	CO1: Understand the nature, scope and approaches of population geography CO2: Understand concepts like fertility, mortality, migration, gender and urbanization CO3: Apply population theories and models in the present day context CO4: Conduct mini research on population using approaches in population geography
9	PG.GEG.C5	Advanced Economic Geography	CO1: On completion of this course, student will gain insights of the various concepts in economic geography and its approaches. Students will able to link economic development with the geo-spatial data.
10	PG.GEG.C6	Practicals in Population and Economic Geography	CO1: The knowledge drawn from this course will acquaint students in analyzing and interpreting statistical data from Census documents, reports, etc and aid in drawing effecting conclusions.
11	PG.GEG.C7	Basics of Geographical Thought	CO1: At the end of this course, student will gain sense of chronological organization and areal variation in human activities. The students will be able to evaluate theoretical concepts from geography and elsewhere; and be able to demonstrate an understanding of the dynamic and contested nature of the discipline and its contemporary issues.
12	PG.GEG.C8	Basics of Research Methodology	CO1: Understand the importance of review of literature in research CO2: Develop skills of writing review of literature CO3: Understand and use different referencing skills CO4: Create hypothesis/formulate CO5: Critically assess literature review/research paper
13	PG.GEG.E5	Advanced Regional Geography of India	CO1: On completion of this course, the students will understand the issues related of disparities in various regions of India. Students will gain a firm knowledge base of various regions in

			India and its resource distributions, particularly from the perspective of physical, environmental and human perspective.
14	PG.GEG.E6	Urban Development and Processes	CO1: On successful completion of the course, it is intended that each student will have achieved an understanding of: i) Application of theoretical knowledge to practical case studies or selected urban set ups. ii) Will be able to undertake mini research on selected urban issues. CO2: Explain and evaluate historical and contemporary global urbanization processes; CO3: Understand the social, economic, demographic dimensions metropolitan areas and impacts country side (city region).
15	PG.GEG.E7	Islands of Indian Ocean	CO1: Students will be able to understand the significance of geo-political location of islands. CO2: Students will be able to understand and analyze the role of history in growth and development of oceanic islands. CO3: Students will be able to critically identify, enquire and reflect on the threats, environmental as well as human, to the Indian Ocean Islands.
16	PG.GEG.E8	Techniques of Academic Report Writing	CO1: The students will understand the various components of academic writing and field report. CO2: The students will be able to formulate effective statement of argument and validate the same CO3: The students will be able to use and apply referencing style as per the requirement of the course.
17	PG.GEG.E9	Geography of Tourism	CO1: At the end of this course students are expected to have a holistic understanding of fundamental concepts of tourism and tourist resources in India and thereby be able to analyze the interrelationships among them. CO2: Understand and describe spatial patterns of international and domestic tourism. CO3: Understand and describe spatial patterns of international and domestic tourism. CO4: Identify tourism actors and career opportunities in tourism.

B.Voc. in 3D Media & Virtual Reality - VFX

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in 3D Media & Virtual Reality - VFX, the studentswill:		
PSO-1	Real World Experience	Gain real world project experience throughout their learning cycle, that helps them to better understand the roles and processes in wide range of computer-generated design and animation careers
PSO-2	Critical thinking and visualization	Use critical thinking skills and problem-solving strategies in all dimensions of development and production.
PSO-3	Following the industry process	Develop an understanding of the industry as a whole by executing all components of development, pre-production, production and post-production planning in at least two disciplinary areas.
PSO-4	Employable Skills	Prepare for employment by developing a plan based upon critical self-reflection and employer/placement feedback.

Course Outcomes: Semester - I

S. No.	Course Code	Course Title	Course Outcomes
1.	VFX – G1	Language Paper	CO-1 To speak fluently, confidently and use correct English. CO-2 To draft letters– formal & informal letters, representations, notices, agendas and minutes of meetings. CO-3 To communicate effectively through written communication.
2.	VFX – G2	Introduction to Creative Writing	CO1: Students will learn to think and write creatively CO2: Improve vocabulary and sentence structures CO3: Learn to critique the writings of their peers CO4: Demonstrate an understanding of literary conventions like plot, character, theme, etc. CO5: Develop a basic understanding of various prose fiction genres.
3.	VFX – G3	History of Indian Art	CO1: Familiarize themselves with works of Indian artists. CO2: Have and appreciation of the various factors that have contributed to the art movements throughout history
4.	VFX – SK1	Drawing and Painting	CO1: Identify the various techniques used and elements required in drawing. CO2: Compose layouts as per their own creative visualizations. CO3: Explore the possibilities of various media, and the diverse conceptual modes available to a painter. CO4: Understand basic principles of design and colour, concepts, media and formats, and the ability to apply them to a specific aesthetic intent.
5.	VFX – SK2	3D Animation - I	CO1: Explore the basic tools and interfaces used to model a 3D animation character. CO2: Positioning 3D objects. CO3: Create 3D object using splines tools and splines modifier. CO4: Manipulate and segregate 3D objects.
6.	VFX – SK3A	Raster Graphics	CO1: Identify the software tools used to create graphics and manipulate images. CO2: Associate the interaction of the tools with the graphics or images to attain the intended result. CO3: Manipulate images to attain the desired result. CO4: Learn to use tools and techniques to be more efficient in your photo-editing skills.

Course Outcomes: Semester – II

S. No.	Course Code	Course Title	Course Outcomes
1.	VFX – G4	Academic Writing	CO1: Gain a complete understanding of each stage of writing process. CO2: Attain practical experience of writing essay outlines, editing drafts, and producing a completed essay for each of the three essay

			types. CO3: Learn to use sources and incorporate them effectively into an essay, adding valuable evidence and authority to an essay. CO4: Develop a strong academic vocabulary using transitional words and comparison and contrast phrases.
2.	VFX – G5	Introduction to Digital Mass Media	CO1: Comprehend the field of digital media. CO2: Understand a few theoretical perspectives behind digital media and the various jargons. CO3: Be comfortable around the various equipment and software required for various media.
3.	VFX – G6	History of Western Art	CO1: Have an appreciation for the various art movements that happened through Europe CO2: Identify artists with their works.
4.	VFX – SK4A	Vector Graphics	CO1: Identify the capabilities and functions of drawing, transformation and shape tools in a vector graphics software. CO2: Sketch virtual art using computer graphics software program. CO3: Apply skills in the combination of bitmapped and vector elements to create design work CO4: Create vector images using a graphic design software.
5.	VFX – SK5	3D Animation - II	CO1: Identify the various modelling techniques. CO2: Associate how the different modelling techniques are used to model a 3D character. CO3: Model advanced 3D characters.

Course Outcomes: Semester III

S. No.	Course Code	Course Title	Course Outcomes
1.	VFX – G7	Environmental Studies - I	CO1: Understand the complex linkages of environment with different disciplines. CO2: Apply the knowledge acquired in this course for environmental management.
2.	VFX – G8	Art Appreciation	CO1: Interpret works of art based on a system of analysis

			CO2: Explain the processes involved in the artistic production, themes, and the political, social, cultural and aesthetic issues that artists examine in their work CO3: Explain the role and effect of visual arts in societies, history, and other world cultures.
3.	VFX – G9	Business Communication	CO1: To apply creative thinking abilities necessary for effective communication in the modern workplace situation CO2: To demonstrate clarity, precision, conciseness and coherence in use of language CO3: To learn how to make one's writing better, faster and more successful CO4: To produce successful documents in any given situation in different formats, while considering the writer's objectives, the reader's needs, the reader-writer relationship and the context. CO5: To increase personal confidence in delivering speeches to small & large audiences CO6: To understand and gain non-verbal skills essential to effective oral communication. CO7: Make proper presentations that disseminate information, conduct negotiation and use persuasion.
4.	VFX – G10	Cyber Security	CO1: Understand the working of a computer network. CO2: Be aware of the various measures that need to be taken in order to protect data. CO3: Able to understand various forms of crimes in cyber world. CO4: Gain knowledge about various rights given to the individual to protect their intellectual property.
5.	VFX – SK7	Visual Effects - I	CO1: Develop and understanding of the visual effects software interface and tools. CO2: Design visual effects sequences using storyboarding and pre-visualization that meet production requirements CO3: Integrate live action sequences with virtual environments seamlessly using masking techniques
6.	VFX – SK8	Video Editing	CO1: Acquire basic skill set to build presentable sequences with video clips provided and export to compressed video files for upload to various media CO2: Understand fundamental concepts of creating and editing videos for different media CO3: Be familiarized with the user interface and work efficiently with video editing

			software
7.	VFX – SK9	Colour Grading	CO1: Gain a broad understanding of colour theory and apply techniques to grading of motion pictures CO2: Confidently use node based workflow of the colour grading software CO3: Perform primary and secondary grading to a round trip project.

Course Outcomes: Semester IV

S. No.	Course Code	Course Title	Course Outcomes
1.	VFX – G11	Environmental Studies – II	CO1: Understand the complex linkages of environment with different disciplines. CO2: Apply the knowledge acquired in this course for environmental management.
2.	VFX – G12	Film Appreciation	CO1: Recognize types of films, their impact on society, and their roles in our lives CO2: Recall concepts such as sound, lighting

			techniques, script, editing, etc. and how they impact a film CO3: List the roles of directors, critics in the film industry CO4: Identify the works of prominent film directors of different genres and various editing styles.
3.	VFX – G13	Print Advertisement	CO1: Learn the different phases involved in a print campaign CO2: Identify and foresee the various existing and upcoming avenues available in the field of print advertising CO3: Learn how to effectively use this information to create and sustain a brand image.
4.	VFX – G14	Personality Enhancement	CO1: To learn to present themselves well and positively influence other people's perceptions of them in a business environment. CO2: To project the right self image and behavioral etiquette by being well groomed. CO3: To learn soft skills like good manners, empathy, ability to collaborate and negotiate and develop etiquettes that are needed in a social and business setting. CO4: To build a positive body language to appear more approachable, confident and professional. CO5: To understand and learn techniques required to sustain good mental health for everyday functioning.
5.	VFX – SK10	Visual Effects-II	CO1: Integrate 2D and/or 3D computer generated imagery and live action elements using compositing techniques. CO2: Analyze images and physical sets to digitally re-create lights, cameras, locations and objects. CO3: Create photo-real images to match live action footage by the application of advanced rendering techniques.
6.	VFX – SK11	Audio Editing	CO1: Get familiarized with a digital audio interface (DAW) to facilitate efficient editing CO2: Learn to record, edit and superimpose audio files on video presentations and animations. CO3: Demonstrate critical decision making as used in a mixdown session

B.Voc. in Multimedia – Digital Filmmaking

PROGRAMME OUTCOMES

Programme Outcomes (PO)	Short Title of the POs	Description of the Programme Outcomes Graduates will be able to :
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO-2	Use of Technology	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-3	Environment and Sustainability	Analyze and attempt solutions to environmental issues and commit themselves to sustainable development in the local/ national and global context.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
PROGRAMME SPECIFIC OUTCOMES (PSO) After successful completion of a Bachelor's degree in Multimedia – Digital Filmmaking, the studentswill:		
PSO-1	Fundamental understanding of core concepts	Show proficiency in at least two disciplinary areas as part of a filmmaking team, including: producing/production, management, screenwriting, directing, camera and lighting, editing, audio, art direction, set design, special effects and television studio production.
PSO-2	Critical thinking and visualization	Develop critical thinking and self-awareness by evaluating a variety of theories and approaches to film analysis.
PSO-3	Following the industry process	Develop an understanding of the industry as a whole by executing all components of development, pre-production, production and post-production planning in at least two disciplinary areas.
PSO-4	Employable Skills	Prepare for employment by developing a plan based upon critical self-reflection and employer/placement feedback.

Course Outcomes: Semester - I

S. No.	Course Code	Course Title	Course Outcomes
1.	MDF – G1	Language Paper	CO1: To speak fluently, confidently and use correct English. CO2: CO-2 To draft letters– formal & informal letters, representations, notices, agendas and minutes of meetings. CO3: CO-3 To communicate effectively through written communication.
2.	MDF – G2	Introduction to Creative Writing	CO1: Students will learn to think and write creatively CO2: Improve vocabulary and sentence structures CO3: Learn to critique the writings of their peers CO4: Demonstrate an understanding of literary conventions like plot, character, theme, etc. CO5: Develop a basic understanding of various prose fiction genres.
3.	MDF – G3	History of Indian Art	CO1: Familiarize themselves with works of Indian artists. CO2: Have and appreciation of the various factors that have contributed to the art movements throughout history
4.	MDF – SK1	Drawing and Painting	CO1: Identify the various techniques used and elements required in drawing. CO2: Compose layouts as per their own creative visualizations. CO3: Explore the possibilities of various media, and the diverse conceptual modes available to a painter. CO4: Understand basic principles of design and colour, concepts, media and formats, and the ability to apply them to a specific aesthetic intent.
5.	MDF – SK2	3D Animation - I	CO1: Explore the basic tools and interfaces used to model a 3D animation character. CO2: Positioning 3D objects. CO3: Create 3D object using splines tools and splines modifier. CO4: Manipulate and segregate 3D objects.
6.	MDF – SK3A	Raster Graphics	CO1: Identify the software tools used to create graphics and manipulate images. CO2: Associate the interaction of the tools with the graphics or images to attain the intended result. CO3: Manipulate images to attain the desired result. CO4: Learn to use tools and techniques to be more efficient in your photo-editing skills.

Course Outcomes: Semester – II

S. No.	Course Code	Course Title	Course Outcomes
1.	MDF – G4	Academic Writing	CO1: Gain a complete understanding of each stage of writing process. CO2: Attain practical experience of writing essay

			outlines, editing drafts, and producing a completed essay for each of the three essay types. CO3: Learn to use sources and incorporate them effectively into an essay, adding valuable evidence and authority to an essay. CO4: Develop a strong academic vocabulary using transitional words and comparison and contrast phrases.
2.	MDF – G5	Introduction to Digital Mass Media	CO1: Comprehend the field of digital media. CO2: Understand a few theoretical perspectives behind digital media and the various jargons. CO3: Be comfortable around the various equipment and software required for various media.
3.	MDF – G6	History of Western Art	CO1: Have an appreciation for the various art movements that happened through Europe CO2: Identify artists with their works.
4.	MDF – SK4A	Vector Graphics	CO1: Identify the capabilities and functions of drawing, transformation and shape tools in a vector graphics software. CO2: Sketch virtual art using computer graphics software program. CO3: Apply skills in the combination of bitmapped and vector elements to create design work CO4: Create vector images using a graphic design software.
5.	MDF – SK5	3D Animation - II	CO1: Identify the various modelling techniques. CO2: Associate how the different modelling techniques are used to model a 3D character. CO3: Model advanced 3D characters.

Course Outcomes: Semester III

S. No.	Course Code	Course Title	Course Outcomes
1.	MDF – G7	Environmental Studies - I	CO1: Understand the complex linkages of environment with different disciplines. CO1: Apply the knowledge acquired in this course for environmental management.
2.	MDF – G8	Art Appreciation	CO2: Interpret works of art based on a system of analysis CO3: Demonstrate an understanding of the terminology and conventions of visual expression. CO4: Explain the processes involved in the

			artistic production, themes, and the political, social, cultural and aesthetic issues that artists examine in their work CO5: Explain the role and effect of visual arts in societies, history, and other world cultures.
3.	MDF – G9	Business Communication	CO1: To apply creative thinking abilities necessary for effective communication in the modern workplace situation CO2: To demonstrate clarity, precision, conciseness and coherence in use of language CO3: To learn how to make one's writing better, faster and more successful CO4: To produce successful documents in any given situation in different formats, while considering the writer's objectives, the reader's needs, the reader-writer relationship and the context. CO5: To increase personal confidence in delivering speeches to small & large audiences CO6: To understand and gain non-verbal skills essential to effective oral communication. CO7: Make proper presentations that disseminate information, conduct negotiation and use persuasion.
4.	MDF – SK7	Digital Photography	CO1: Plan and execute the creation of photographic imagery following an iterative process of research, ideation, visualization, analysis, production and evaluation. CO2: Develop visual communication concepts for specific purposes and audiences. CO3: Incorporate the knowledge of photography theories, principles and historical practices into the conceptualization and development of effective photographs. CO4: Create a business plan to support the development and on-going operation of a photography business.
5.	MDF – SK8	Digital Cinematography-I	CO1: Understand the basic rules and methods used in film production in various film industries CO2: Analyze story structure and the screenwriting process for use in the critique and creation of film. CO3: Understand and apply cinematography practices to tell a visual story

6.	MDF – SK9	Video Editing	CO1: Acquire basic skill set to build presentable sequences with video clips provided and export to compressed video files for upload to various media CO2: Understand fundamental concepts of creating and editing videos for different media CO3: Be familiarized with the user interface and work efficiently with video editing software CO4: Edit and compress video for use in various delivery modes of digital media using standard digital video editing software.

Course Outcomes: Semester IV

S. No.	Course Code	Course Title	Course Outcomes

1.	VFX – G11	Environmental Studies – II	CO1: Understand the complex linkages of environment with different disciplines. CO2: Apply the knowledge acquired in this course for environmental management.
2.	MDF – G12	Film Appreciation	CO1: Recognize types of films, their impact on society, and their roles in our lives CO2: Recall concepts such as sound, lighting techniques, script, editing, etc. and how they impact a film CO3: List the roles of directors, critics in the film industry CO4: Identify the works of prominent film directors of different genres and various editing styles.
3.	MDF – G13	Print Advertisement	CO1: Learn the different phases involved in a print campaign CO2: Identify and foresee the various existing and upcoming avenues available in the field of print advertising CO3: Learn how to effectively use this information to create and sustain a brand image.
4.	MDF – G14	Personality Enhancement	CO1: To learn to present themselves well and positively influence other people's perceptions of them in a business environment. CO2: To project the right self-image and behavioral etiquette by being well groomed. CO3: To learn soft skills like good manners, empathy, ability to collaborate and negotiate and develop etiquettes that are needed in a social and business setting. CO4: To build a positive body language to appear more approachable, confident and professional. CO5: To understand and learn techniques required to sustain good mental health for everyday functioning.
5.	MDF – SK10	Digital Cinematography-II	CO1: Understand characteristics of light and use of various lighting techniques to compose a visually appealing shot CO2: Acquire skills needed to successfully transform a storyboard into a shot. CO3: Gain understanding of fundamental aesthetic and conceptual approaches to digital cinematography. CO4: Critically observe, analyse and translate between real world lighting and motion picture lighting.
6.	MDF – SK11	Audio Editing	CO1: Get familiarized with a digital audio interface (DAW) to facilitate efficient editing CO2: Learn to record, edit and superimpose audio files on video presentations and animations.

			CO3: Demonstrate critical decision making as used in a mixdown session CO4: Make informed judgements as to the quality of a sound recording through analysis of the audio signal.

Diploma in Aviation Hospitality & Customer Service

Programme Outcomes (PO)	Short Title of the Pos	Description of the Programme Outcomes Diploma Holders will be able to:
PO-1	Problem Analysis and Solutions	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO - 2	Use of Technology	Think critically, identify, analyze problems/ situations and further attempt to design/ develop solutions that meet the specified goals.
PO - 3	Environment and Sustainability	Apply appropriate IT tools efficiently in their daily activities of communication and academics.
PO-4	Ethics	Recognize and understand professional ethics /human values and be responsible for the same.
PO-5	Individual and Team work	Function effectively at various levels, capacities and situations.
PO-6	Communication	Communicate proficiently (oral and written) as a responsible member of society.
PO-7	Research Aptitude	Understand general research methods and be able to analyse, interpret and derive rational conclusions.
PO-8	Life Skills	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.
Program Specific Outcomes (PSO)		
After successful completion of Diploma in Aviation Hospitality & Customer Service the students will:		
PSO - 1	Real World Experience	Gain real world experience throughout their internship program, that helps them to better understand the roles in the Hospitality & Aviation Industry
PSO - 2	Critical thinking & Conflict Resolution	Use critical thinking skills and problem-solving skills in all dimensions of Customer Service
PSO - 3	Following the industry nuances	Develop an understanding of the industry as a whole by understanding the various departments involved in the industry
PSO - 4	Employable Skills	Prepare for employment by developing a plan based upon critical self-reflection and employer/placement feedback.

Sr. No.	Course Code	Course Title	Course Outcomes
1	APS-AHC 1	Customer Service	CO-1 Identify and deliver Customer service CO-2 Connect and effectively communicate with customers CO-3 Resolve customer problems /complains using policies and operating procedures CO-4 Create customer delight during service delivery
2	APS-AHC 2	Hospitality	CO-1 Explain the relevance of lodging and food service operations to the travel and tourism industry. CO-2 Distinguish the functions of the hotels CO-3 Be able to work in the Housekeeping, front office and food and beverage service departments with basic knowledge of the culinary CO-4 Deliver high quality Guest service in front of the house departments
3	APS-AHC 3	Aviation	CO-1 Relate to an operational cycle as a trainee cabin crew CO-2 Prioritization of safety, security and first aid CO-3 Classify the support operations and work in sync with other areas within the industry like ground staff and commercial/logistics job roles in the aviation industry. CO-4 Familiarize with professional terminology during operations
4	APS-AHC 4	Personality Development	CO-1 Identify the importance of a positive personality CO-2 Change personal grooming and hygiene as per industry standards CO-3 Be able to present oneself with social grace and etiquette CO-4 Demonstrate professional know about during interviews
5	APS-AHC 5	Internship	
6	APS-AHC 6	Communication Skills	CO-1 Communicate with Guest, Clients, passengers. CO-2 Have a fair understanding of business Communications. CO-3 Compare the difference between personal and business communications CO-4 Be able to communicate with poise, correct grammar and better diction.
7	APS-AHC 7	Conversational French	CO-1 Appreciate French hospitality & service. CO-2 Communicate effectively in a business setting. CO-3 Use Basic gastronomical terminology in French. CO-4 Have a fair understanding of French conversational Grammar

8	APS-AHC 8	Travel Geography	CO-1 Read maps, understand time zones in detail CO-2 Appreciate the importance of basic geography in tourism and travel. Understand the potential in various tourism generating regions of the world Demonstrate the knowledge of the cultural zones of continents. CO-3 Describe the physical features and places of tourist importance in India CO-4 Demonstrate professional know about during interviews
9	APS-AHC 9	Grooming	CO1 - Ability to make a positive first impression CO2 - Ability to make a lasting impression CO3 - Improvement in overall appearance CO4 - Enhanced overall conduct during formal & informal occasions CO5 - Better ability to communicate behavioral expectations to subordinates
10	APS-AHC 10	Community Outreach	CO1 - Work with communities to build change strategies that promote social and economic justice and challenge patterns of oppression and discrimination. CO2 - Create a community engagement plan utilizing principles of community leadership and volunteer management. CO3 - Facilitate conflict resolution and consensus building among groups and individuals through effective mediation strategies and skills.
11	APS-AHC 11	Cruise Familiarization	CO-1 Describe the Cruise industry and how these are managed to cater to the global demand trends. CO-2 Compare and contrast the operations and management of land-based property from a floating resort. CO-3 Examine the marketing strategies, organizational structure, recreational activities and facilities/amenities for the different cruise line companies.

CORE COURSE: BASIC MICROBIOLOGY	
COURSE CODE:	**BIO-II.C-4**
MARKS:	**100** (75 – Theory, 25 – Practical)
CREDITS:	**04** (03 – Theory, 01 – Practical)
CONTACT HOURS:	**Theory:** 45 Hours (3 Lectures per week) **Practical:** 30 Hours (1 Practical per week)
COURSE OUTCOMES:	On the successful completion of the course, the students will be able to: **CO1:** Understand the scope and importance of Microbiology, classification schemes, cultivation, preservation and maintenance of the microbial cultures. **CO2:** Discriminate between various groups of microorganisms and also comprehend the beneficial and harmful effects of each group of microorganisms. **CO3:** Compare, analyze and apply concepts of the principle and working of various types of microscopes. **CO4:** Adhere to strict laboratory safety measures to be followed in a microbiology laboratory. **CO5:** Master skills in aseptic techniques as well comprehend the importance of cleaning and decontamination.

BIO-II.C-4: BASIC MICROBIOLOGY (THEORY)

MODULE	TOPICS	CONTACT HOURS	TOTAL CONTACT HOURS
MODULE 1: Scope & historical perspective, basics of microscopy, taxonomy and reproduction in bacteria	**1.1 : History and Scope of Microbiology** Historical account from 16^{th} – 19^{th} century **.1.2 : Basics of Microscopy** Principle of working of light microscope (Bright-field, Dark-field, Phase-contrast, Fluorescence). **1.3 : Bacterial Taxonomy** Introduction to Archaea; taxonomic ranks; classification systems (Phenetic, Numerical, Phylogenetic); Bergey's Manual of Systematic/ Determinative Bacteriology and rDNA sequencing. **1.4 : Reproduction in bacteria – 1** Binary fission; definitions: cell growth, growth rate, generation time	**02** **03** **08** **02**	**15**
MODULE 2: Methods of cultivating and preserving bacteria and an introduction to extremophiles	**2.1 : Cultivation of microorganisms** Sterilisation; disinfection; decontamination: principle and methods; types of culture media: synthetic/defined, complex solid, liquid, enrichment, selective, differential; cultivation of microorganisms: broth culture, agar plate, pour plate; determination of viable count: serial dilution; spread plating; determination of colony forming units (cfu) and calculation of viable count; isolation of pure cultures: streak plate; colony morphology. **2.2 : Maintenance and preservation of microbial cultures** Slant and stab cultures; periodic transfer; storage in	**08** **04**	**15**

	sterile soil; overlaying with mineral oil; glycerol stocks; preservation in liquid nitrogen; lyophilisation. **2.3 : Bacteria in Extreme Environments** Thermophiles, barophiles, halophiles, acidophiles and alkaliphiles.	**03**	
MODULE 3: Ultrastructure of a bacterial cell, growth curve – types, characteristics and an introduction to viruses	**3.1 : Organization and Ultrastructure of a Bacterial cell** Cell wall: structure and chemical composition in Gram positive and Gram negative bacteria; introduction to cell membrane, pili, fimbriae and capsule; flagella structure and function; nucleoid and plasmids: nature and function; endospore: structure, sporulation and germination; reserve materials. **3.2 : Reproduction in bacteria – 2** Bacterial growth curve; characteristics of growth phases; diauxic growth curve, continuous and synchronous growth **3.3 : Viruses** Basic classification and structure of viruses (prokaryotic and eukaryotic); characteristic features of λphage; viral replication (lytic and lysogenic).	**08** **02** **05**	**15**

BIO-II.C-4: BASIC MICROBIOLOGY (PRACTICAL)

SR. NO.	PRACTICAL	NO. OF PRACTICALS
1.	Introduction to laminar air flow unit, autoclave, pH meter, incubator, microwave & Introduction to microscope	01
2.	Preparation and sterilization of glassware	01
3.	Preparation of media and autoclaving	02
4.	Preparation of agar plates and open air cultures	01
5.	Serial dilution technique and spread plating	02
6.	Bacterial isolation techniques: streaking methods - simple continuous, T-streak, quadrant, radiant.	01
7.	Preparation and staining of specimen- simple staining, Gram staining, endospore staining	03
8.	Biochemical tests for bacterial identification: sugar fermentation and IMViC tests	02
9.	Isolation and staining of Fungi by lactophenol cotton blue	01
10.	Cleaning and decontamination	01

REFERENCES

- Anantnaryan, R. &Paniker, C.K.J. (2005). Text book of Microbiology, 7th edition, Orient Blackswan.
- Aneja, K. R. (2007). Experiments in Microbiology, Plant Pathology and Plant Tissue Culture, New Age International.
- Gunasekaran, P. (1995). Laboratory Manual in Microbiology, New Age International.
- Madigan, M. T., Martinko. J. M. & Parker J. (2007). Brock's Biology of Microorganisms, Pearson Prentice Hall.
- Pelczar, M.J., Chan E, C.S. & Krieg, N.R. (1993). Microbiology, Fong and Sons Printers Pvt. Ltd.
- Stanier, R.Y. (1993) General Microbiology, Cambridge University.
- Willey, J. M., Sherwood, L., Woolverton, C. J. & Prescott, L. M. (2008). Prescott, Harley, and Klein's Microbiology, New York, McGraw-Hill Higher Education.

Course Title: E-Learning
Course Code: COM-GEC.2
Marks: 100
Credits: 4
Duration: 60 HRS

Prerequisite Courses: Nil

Course Objectives:

To understand basic concept of ICT (Information Communications Technology) in education.
To understand basic concept of Instructional Design principles.
To develop and apply the various concepts of Instructional Design skills learnt wrt E-Learning .
To develop E-content in various application areas related to ICT and Education.

Course Outcomes:

On completion of this course the student will be able to:

CO1: Explain the working of an E-learning module.
CO2: Explain the various Instructional Design Principles.
CO3: Develop own course material and upload it using an appropriate LMS.
CO4: Evaluate and apply appropriate Assessment techniques to the E-content
CO5: Differentiate between Summative and Formative assessment.
CO6: Write Learning and Course objectives.

SYLLABUS

UNIT I: Introduction and E-learning Strategies [15 HRS]

Scope and form of E-learning, Role of an E-learning project Phases in E-learning project. E-learning Strategies: Simulation, Drill, Interactive Learning, Problem Solving,Tutorials.

Activity:

1. Construct a Mindmap (using Freemind or any other FOSS).

UNIT II: Course Development [15 HRS]

Introduction to Instructional Design.The process of Designing Instruction.Developing Materials.(Story Boarding, Content Integration, and SCORM Compliance).Working with L.M.S. (Learning Management System)- Installation and use of the administrator, teacher and student interface. Course Definition, Registration and upload, tracking of results).

Activities:

1. Creating and Running a complete course using LMS Course Administration: Creation and using Resources and Planning Activities.
2. Creating Storyboards (using Movie Maker/PPT or similar FOSS).

UNIT III :E-learning & Pedagogical Approaches [15 HRS]

The Behaviorist School of learning and its implications on E-learning, The Cognitive School of Learning and its Implication on E-learning, The Constructivist School of Learning and its implications on E-learning, Blooms Taxonomy of Educational Objectives, Types of Learning Objectives, Content Analysis (Types- Facts, concepts, process, procedure, principles). The Teaching of concepts, procedure, principles, understanding. Enabling a motivated Learning Environment.

Activity:

1. Prepare a 10-minute Video tutorial on some system (e.g. how to search for free images in Google) using screen cast/Powtoon. Example tool that can be used: screen cast-o-matic).

UNIT IV:Assessment Design [15 HRS]

Online formative and summative assessment. Rubrics for Assessment- Analytic and Holistic Rubrics, Security and Authentication.

Activities:

1. Design Rubrics using any application (for a given scenario).
2. Create a fully tagged 10-question QB on a topic and load onto Moodle.

REFERENCES:

MANDATORY:

Shelly Cashman Gunter.(2011).Teachers Discovering Computers: Integrating Technology in the Classroom,(7th ed.).Wadsworth Publishing Co Inc.

SUPPLEMENTARY:

1. Smith, P. L. & Ragan, T. J.(2008). Instructional design(4rth ed.). New York: John Wiley & Sons. ISBN:0471393533
2. M.D. Roblyer, Aaron H. Doering(2018). Integrating Educational Technology into Teaching: Student Value Edition (8th ed.). Publisher: Pearson ISBN-10: 013289680X, ISBN-13:978-0132896801.
3. Dick, W., Carey, L., & Carey, J. O.(2014). The systematic design of instruction (8th ed.). Boston: Allyn and Bacon.
4. Wiggins, G. P., & McTighe, J.(2005). Understanding by design (2nd ed.). Assn. for Supervision & Curriculum Development;
5. Alexandria, VA: Association for Supervision and Curriculum Development.
6. Christensen, C. M., Horn, M. B., & Johnson, C. W.(2016). Disrupting class: How disruptive innovation will change the way the world learns(2nd ed.). New York: McGraw- Hill.

WEB BASED:

1.https://www.udemy.com/course/instructional-design-for-elearning/
2.https://nptel.ac.in/courses/127101013/
3.https://nptel.ac.in/courses/121105010/
Better learning (Bloom's Taxonomy):
4. https://www.plesyoutube.com/watchv=0flnAoX9QEw
Assessment:
5.https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/121106012/lec13.pdf

****

Course Title: Human Computer Interface
Course Code: COM-E8
Marks: 75
Credits: 03
Duration: 45 Hours

Pre-requisite course: Nil

Course Objectives:

- To study the different aspects of human computer interaction.
- To study computer interface design concepts.

Course Outcomes:

Upon completion of the course student will be able to:

CO 1: To understand the intricacies of human interaction with a computer System.
CO 2: To understand the concept of a graphical user interface, and its design characteristics.
CO 3: To recognize the human element its strengths and weakness for computer interaction.
CO 4: To know the principles of good screen design and layouts.
CO 5: To know the different navigation schemes on windows-based interface; learn the different types of selection devices and components of a window-based interface.
CO 6: To know the different types of interaction devices and media.

SYLLABUS:

UNIT I: Introduction to Human Computer Interaction: [10 HRS]
Human-Computer Interaction, Evaluating Designs, The Birth of HCI. Importance of user Interface, Importance of good design, Benefits of good design, principles & heuristics of good design. Importance of: Human characteristics, Human consideration, Human interaction speeds, Understanding business functions. User centered design- Need-finding: Participant Observation, Interviewing, Additional Need finding, contextual inquiry & persona.

UNIT II: Rapid Prototyping and Graphical Interface Design: [20 HRS]
Rapid Prototyping: Story boarding. Paper Prototyping and Mockup, Video Prototyping, Creating and Comparing Alternatives.

Direct Manipulation. Mental Models. Heuristics (guidelines) for design.

Graphical Interface Design: Graphical user interface, standards such as Microsoft windows HCI guidelines, Windows: Navigation schemes selection of window; Selection of devices based and screen-based controls, Components, Text and messages, Icons, Multimedia, Colors., controls, help & error messages design.

UNIT III: Heuristic Evaluation and Visualization [15 HRS]
Web user interface design – Jessy James Garette five layers of user experience.
Heuristic Evaluation: Heuristic Evaluation — Why and How?
Visualization, Amount of information, Focus and emphasis, Presentation information simply and meaningfully, Information retrieval on web, Statistical graphics.

REFERENCES:

Mandatory:
1. Cooper, A., Reimann, R., & Dubberly, H. (2003). About face 2.0: The essentials of interaction design. John Wiley & Sons, Inc..
2. Alan.D, Janet.F, Gregory D. and Russell,B. (2012) Human-Computer Interaction, Prentice Hall.
Supplementary:
1. Shneiderman, B., & Plaisant, C. (2010). Designing the user interface: strategies for effective human-computer interaction. Pearson Education India.
2. Donald.A.N. (2010) The Design of Everyday Things Basic Books.

WEB BASED:

1. http://hcibib.org/
2. https://www.tutorialspoint.com/human_computer_interface/index.htm.
3.https://www.academia.edu/4955516/Wiley_The_Essential_Guide_to_User_Interface_Design_3rd_Edition_Apr_2007?auto=download.
4. https://www.slideshare.net/busaco/hci-2015-110-humancomputer-interaction-overview?qid=1c116f30-ec87-4eb4-a375-49b2bbe65d75&v=&b=&from_search=2

Practicals: Human Computer Interface
Credit : 1
Marks : 25
Duration: 30 Hrs

Suggested list of practical (Numbers in brackets indicate number of practicals)
1. Paper Prototyping using templates (1)
2. Conducting survey interview and summarizing the result(1)
3. Persona- conducting contextual interview and developing persona(1)
4. GUI design- form design, menu design, help, error messages(2)
5. Web UI design- pages, navigation, controls, Page submission – Asynchronous (2)
6. Report designs (2)
7. Visualization and info graphics (1)
8. Heuristic evaluation(2)
9. Story boarding (1)

****

BIO-VI.C-8: INDUSTRIAL BIOTECHNOLOGY

COURSE TITLE: INDUSTRIAL BIOTECHNOLOGY (THEORY)
COURSE CODE: BIO-VI.C-8
MARKS: 75
CREDITS: 3
TOTAL HOURS: 45
PRE-REQUISITES: Completion of BIO-II.C-4-Basic Microbiology

Course Objective

This course is designed to introduce the students to the basic concepts in Industrial Biotechnology. The course covers concepts in Industrial Biotechnology, mainly introducing the basics of upstream processes in fermentation technology on an industrial scale.

Course Outcomes

On the successful completion of the course, students will be able to:
CO1: Understand and explain various parts of a fermentor.
CO2: Comprehend various concepts of Upstream and Downstream processes.
CO3: Describe the production processes of fermentation products like wine or vinegar at the industrial level.
CO4: Design small scale experiments to produce common enzymes like amylase.
CO5: Prepare basic fermentation products like wine, vinegar, etc.

BIO-VI.C-8: INDUSTRIAL BIOTECHNOLOGY (THEORY)

Module I **15 hrs**

Fermentation equipment and its use **10 hrs**

Definition of fermentor/bioreactors; structure of ideal fermentor**;** definition and uses of impellers and their types; spargers and their types;baffles; headspace**;** controls and sensors (temperature, pH, antifoam, dissolved oxygen and carbon dioxide sensor)**;** types of reactors (definition, description, diagram and uses)-stirred tank reactors; bubble columns; airlift bioreactors (internal and external loop); fluidised bed; packed bed column, photobioreactors; tray bioreactors

Screening and selection of microorganisms **3 hrs**

Primary screening-definition; techniques; crowded Plate; auxanography; enrichment; indicator dye; secondary screening- definition and features; giant colony technique

Stock cultures **2 hrs**

Cryogenic preservation**;**aims of preservation of cultures; definition of working and primary stock cultures**;** techniques of preservation- serial subculture , sterile soil, water , silica gel; sterile mineral oil; lyophilisation

Module II **15 hrs**

Types of fermentation processes **3 hrs**

Continuous; submerged; surface/solid state; batch; fed-batch

Fermentation media **5 hrs**

Characteristics of an ideal; production media; media composition – crude, synthetic; media; sterilization -Heat, radiation, chemical methods and filtration; batch and continuous sterilization, inoculum preparation

Detection and assay of fermentation products **5 hrs**

Physical or chemical assay- titration and gravimetric assay; turbidity analysis and cell determination; spectrophotometric assay; chromatographic partition assay; biological assay-concept benefits and drawbacks; diffusion assay;turbidimetric and growth assay; end point assay; metabolic response assay; enzymatic assay

Scale up of fermentations and increasing product yields **2 hrs**

Significance of scale up; pilot fermenters**;** increasing product yields by mutagens-physical and chemical mutagens/strain improvement

Module III **15 hrs**

Downstream processing **10 hrs**

Biomass: separation of cells – flocculation; floatation; filter aids and filtration (surface, depth); centrifugation- batch centrifuge eg. tubular bowl centrifuge; continuous centrifuge eg. basket centrifuge; disintegration in brief: mechanical eg: ultrasonication; homogenisers and use of ballotini; non mechanical eg. thermallysis; chemical detergent solubilisation, organic solvents; enzymatic methods eg. lysozyme

Broth: Enrichment: evaporation, membrane filtration, liquid-liquid extraction, precipitation, adsorption

Purification: chromatography

Formulation - crystallization and drying (convection drying eg. spray dryers, freeze drying)

Industrial production **5 hrs**

Organisms; fermentation media and conditions;downstream processing and uses -alcohol /Wine; penicillin,vinegar

BIO-VI.C-8: INDUSTRIAL BIOTECHNOLOGY (PRACTICAL)

COURSE TITLE: INDUSTRIAL BIOTECHNOLOGY (PRACTICAL)
COURSE CODE: BIO-VI.C-8
MARKS: 25
CREDITS: 1
TOTAL HOURS: 30

1. A study on the phases of growth of microorganisms during batch fermentation (equipment: Erlenmeyer flask, medium: nutrient broth, inoculum: *E.coli*).
2. Parts of a fermentor
3. Preparation and sterilization of medium for batch fermentation process
4. Batch fermentation using fermentor
5. Preparation and sterilization of medium for fed-batch fermentation process
6. Fed-batch fermentation
7. Decontamination and sterilization of the fermentor
8. Primary screening of antibiotic producing bacteria by crowded plate technique
9. Secondary screening for antibiotic producers by Giant Colony Technique
10. Production of wine (from pineapple or any other fruit/vegetable) using yeast
11. Production of vinegar from toddy
12. Estimation of total reducing sugars and acidity (total and volatile) in wine and vinegar (before and after fermentation)

REFERENCES

1. Casida L.E. (2009). Industrial Microbiology, New Age International (P) Ltd. New Delhi.
2. Patel A.H. (2012). Industrial Microbiology, MacMillan Publishers India Ltd.
3. Prescott & Dunn. (1982). Industrial Microbiology, 4th edition, AVI Publishing Co.
4. Ratlege C. & Kristiansen B. (2001). Basic Biotechnology, 2nd edition. Cambridge university press.
5. Stanbury P. F, Whitaker A. & Hall. (1997). Principles of fermentation technology, 2nd Edition, Aditya Books Pvt. Ltd, New Delhi.
6. WulfCruger and AnnelieseCruger, A Textbook of Industrial Microbiology. 2007. Sinauer associates pub.
7. Prave P., Faust U., Sitting W., Sukatsch D.A., Fundamentals of Biotechnology. 2004. VCH publishers.
8. Prescott and Dunn, Industrial Microbiology. 4thed, 1982. AVI Pub Co.
9. Sivasankar B., Bioseparations: Principles and techniques. 2005. Prentice hall of India pvt ltd New Delhi.
10. Collin Ratlege, Basic Biotechnology. 2006. Cambridge university press.

WEB REFERENCES

1. https://www.ncbi.nlm.nih.gov/books/NBK234683/ (Wine Fermentation)
2. https://www.ncbi.nlm.nih.gov/books/NBK236005/ (Downstream processing)
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4027325/ (Isolation and Screening)
4. https://www.youtube.com/watch?v=3pL2X-8-eVk (Fractional Distillation)
5. https://www.sciencedirect.com/science/article/pii/S2095809917304241 (Photobioreactors)