

PROGRAM OUTCOME ACADEMIC YEAR 2021-22

PROGRAM	PROGRAM OUTCOMES	
BACHELOR OF BUSINESS ADMINISTRATION IN COMPUTER APPLICATION B.B.A(CA)Degree	PO-1	To provide sound academic base from which an advanced career in Computer Application Can be developed. Conceptual grounding in computer usage as well as its practical business application will be provided.
	PO-2	To produce skill oriented human resource.
	PO-3	To import practical skills among students.
	PO-4	To make industry ready resource.
	PO-5	To bring the spirit of entrepreneurship.
BACHELOR OF COMPUTER APPLICATION (BCA)	PO	<u>Program Outcome:</u> To produce skill oriented human resource .
		To bring the spirit of entrepreneurship.
		To import practical skills among students.
		Acquire practical skills and hands-on experience on emerging technologies like Java, Web designing, Android, Python, IoT, PHP and Data Science.
		Acquiring knowledge in basic management skills and business applications
		Develop a sound academic base for an advanced career in Computer Applications.
	BACHELOR OF ARTS	
DEPARTMENT OF BACHELOR OF ARTS		1) The B.A. graduates can pursue B.Ed. course and opt teaching career in the schools. 2) Students can do Post Graduate Studies in their respective subjects studied in 'Under Graduate' level. Other Career options :-

		<p>Journalism, Tourism, etc.</p> <p>3) Students become eligible to appear for any competitive exams conducted by Union Public Service Commission (UPSC), Maharashtra Public Service Commission (MPSC), Indian Railway Board, Bank and PO exams etc for entering into the government services.</p> <p>4) Students can pursue their studies in doing MBA, Post Graduate Diploma in Computer (PGDC), Certificate Courses of any discipline.</p> <p>5) Students can develop various communication skills such as reading, listing, speaking, etc., which will be helpful in expressing ideas and views clearly and effectively. Graduates demonstrate social interaction and understand environment and sustainability.</p>
SCIENCE		
BACHELOR OF SCIENCE and MASTER OF SCIENCE	PO1	After completion of three year graduate, Student should Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life
	PO2	Acquired the knowledge with facts and figures related to various subjects in pure sciences such as Physics, Chemistry, Botany, Zoology, Mathematics, etc.
	PO3	Acquired the skills in handling and applications of available scientific instruments, planning and performing in laboratory experiments in present subjects in their level
	PO4	Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions
	PO5	Thinking and developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments
	PO6	Developed scientific outlook not only with respect to science subjects but also in all aspects related to life and community by participating in various social and cultural activities voluntarily
	PO7	Developed various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively
	PO8	Realized that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life
COMMERCE		
BACHELOR OF COMMERCE		<p>1) Students will be able to understand the various aspects of development in Agricultural, Industrial and service sector in India.</p> <p>2) After completing three years for Bachelor's in Commerce (B.Com) program, students would gain a thorough grounding in the fundamentals of Commerce and Finance.</p>

		<p>3). The programme will give knowledge about various new concepts in computerized system and Forensic Audit to students.</p> <p>4) The commerce and finance focused curriculum offers a number of specialization and practical exposure which would equip the student to face the modern day challenges in commerce and business.</p> <p>5) The all-inclusive outlooks of the course offer a number of values based and job oriented courses ensure that students are trained into up-to-date.</p> <p>6) This program could provide well trained professional for the industries, Banking sector, Insurance companies, financing companies, Transport agencies, Warehousing etc. to meet the well-trained manpower requirements.</p> <p>7) The graduates will get hands-on experience in various aspects acquiring skills for Marketing manager, selling manager, over all administration abilities of the company.</p>
<p>MASTER OF COMMERCE</p>		<p>1.The programme will create the awareness about the latest developments in the field of capital market in India.</p> <p>2. The programme will enable the students to understand various transactions in stock exchanges and agencies involved in it.</p> <p>3. The programme will give knowledge about basic issues in Industrial Economic Environment to students.</p> <p>4. The programme will enhance capabilities of students to conduct the research in the field of business and social sciences</p> <p>5.The programme will develop independent logical thinking and facilitate personality development and equip the students to seek suitable careers in management and entrepreneurship.</p> <p>6) Enriched knowledge with new ideas and techniques essential for business and management.</p> <p>7) Develop analytical interpretative and presentation skill regarding research in commerce and management.</p>

PROGRAMME SPECIFIC OUTCOMES

ACADEMIC YEAR 2021-22

Programme Specific Outcomes	
Upon completion of these courses the student would	
DEPARTMENT OF BACHELOR OF BUSINESS ADMINISTRATION IN COMPUTER APPLICATION	
B.B.A(CA)Degree	
PSO-1	Students should be able to apply modern practices and strategies in software project development using open-ended programming environments to deliver quality product for Business success in context with societal needs.
PSO-2	An ability to gain knowledge on design and control strategy; techniques to secure information and adapt to the fast changing world of information technology needs.
PSO-3	Design and develop Web and Mobile based computer applications
PSO-4	An ability to use and develop cloud software, administrative features, infrastructure services and architectural patterns; ethical hacking and forensic security technologies.
Program Specific Outcome BACHELOR OF COMPUTER APPLICATION (BCA)	
PSO-1	Ability to correlate theory and practical knowledge in applications.
PSO-2	Become employable in various public and private sectors.
PSO-3	Blend analytical, logical, and managerial skills with technical aspects to resolve real-world issues.
Program Specific Outcome BACHELOR OF COMMERCE	
PSO-1	Students will be able to demonstrate progressive learning of various tax issues and tax forms related to individuals.
PSO-2	Students will be able to demonstrate knowledge in setting up computerized set of accounting books.
PSO-3	Students will demonstrate progressive affective domain development of values, the role of accounting in society and business.
PSO-4	Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.
PSO-5	Students will learn relevant managerial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.
PSO-6	Learners will gain thorough systematic and subject skills

Program Specific Outcome MASTER OF COMMERCE	
	<ul style="list-style-type: none"> a. Impart the students with higher level knowledge and understanding of contemporary trends in commerce and business finance. b. Equip the students to evaluate environmental factors that influence business operation with the conceptual requirements and skills on preparation and interpretation of financial statements. c. Prepare the students to apply statistical methods and proficient use of tools for modeling and analysis of business data. d. Facilitate the students to apply capital budgeting techniques for investment decisions. e. Prepare students to appraise the structure and operations of banking systems. f. Prepare the students for an in-depth analysis of investment, portfolio management, investment banking and liquidation of investments. g. Develop competency in the students about the laws and regulations and roles of commercial, government and central banks in controlling money market and inflation. h. Facilitate the students to analysis and frame micro financing schemes for rural banking. Impart the students the concept of risk mitigation in financial sectors and their role in investment decisions of individuals and business enterprises. i. Provide guidance to students to plan and undertake independent research in a chosen discipline. j. Train the students on teamwork, lifelong learning and k. continuous professional development
Program Specific Outcome BACHELOR OF SCIENCE	
PSO1	Upon completion of the Graduate Chemistry sequence, chemistry majors are able to recognize and apply the principles of atomic and molecular structure to predict chemical properties and chemical reactivity
PSO2	Upon completion of a degree, chemistry majors are able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in chemical industry or a chemistry graduate program.
PSO3	Upon completion of a chemistry degree, chemistry majors are able to interpret and analyze quantitative data.
PSO4	Upon completion of a BSC in Chemistry degree, students are able to understand theoretical concepts of instruments that are commonly used in most chemistry fields as well as interpret and use data generated in instrumental chemical analyses.
PSO5	Understand the basics in Atomic Structure, Errors in analysis, Acids, Bases, Its strength, Electrophilic, Nucleophilic Periodicity, Qualitative, Quantitative analysis, Chromatographic Techniques, Kinetic reactions, Conductance, Phase rules, Nuclear reactions, Quantum, MOT, Sidgwick, LFT, CFT, Coordination Chemistry, Industries like Agro, Cement, Glass, Food, Sugar, Soap, Dye etc.
PSO6	The ability to apply such knowledge and understanding to the solution of qualitative and quantitative problems
PSO7	Basic knowledge of spectra of molecular, atomic, UV, IR and NMR

PSO8	Approach to Green Chemistry and protection of environment and waste management
PSO9	Progression to HE
SCIENCE	
Chemistry (UG, PG)	<ul style="list-style-type: none"> a. Expectation of all PO of Graduate in Science. b. Upon completion of the Graduate Chemistry sequence, chemistry majors are able to recognize and apply the principles of atomic and molecular structure to predict chemical properties and chemical reactivity. c. Upon completion of a degree, chemistry majors are able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in chemical industry or a chemistry graduate program. d. Upon completion of a chemistry degree, chemistry majors are able to interpret and analyze quantitative data. e. Upon completion of a BS in Chemistry degree, students are able to understand theoretical concepts of instruments that are commonly used in most chemistry fields as well as interpret and use data generated in instrumental chemistry. f. Understand the basics in Atomic Structure, Errors in analysis, Acids, Bases, Its strength, Electrophilic, Nucleophilic Periodicity, Qualitative, Quantitative analysis, Chromatographic Techniques, Kinetic reactions, Conductance, Phase rules, Nuclear reactions, Quantum, MOT, Sidgwick, LFT, CFT, Coordination Chemistry, Industries like Agro, Cement, Glass, Food, Sugar, Soap, Dye etc. g. The ability to apply such knowledge and understanding to the solution of qualitative and quantitative problems. h. Basic knowledge of spectra of molecular, atomic, UV, IR and NMR. i. Approach to Green Chemistry and protection of environment and waste management. j. Progression to HE
Botany	<ul style="list-style-type: none"> a. Students understand the key role of the plants in environment. b. Students care about the sustainable use of the various plants. And its products. c. Understands various role of abiotic factors for day-to day life of the plants and man. Students understand the various minerals and growth hormones. d. To inculcate sense of start ups, while maintaining social and environment awareness and promote the possibility of self-employment after B.Sc e. To help students build-up a progressive and successful career in plant tissue culture and agro industries
Zoology	<ul style="list-style-type: none"> a. To provide thorough knowledge about various animal sciences from primitive to highly evolved animal groups b. To make the students aware of applications of Zoology subject in various industries c. To highlight the potential of various branches to become an entrepreneur d. To equipped the students with skills related to laboratory as well as field based studies

	<ul style="list-style-type: none"> e. To make the students aware about conservation and sustainable use of biodiversity f. To inculcates interest and foundation for further studies in Zoology g. To address the socio-economic challenges related to animal sciences h. To facilitate students for taking up and shaping a successful career in Zoology i. To bridge up the gap between knowledge based conventional education and market demands and to provide an alternative to those pursuing higher education. j. To enrich students' training and knowledge to practices of Applied zoology in Cottage industry k. To introduce the various techniques of rearing of useful animals. l. To inculcate sense of job responsibilities, while maintaining social and environment awareness m. To help students build-up a progressive and successful career in industries with a biochemical perspective k. To promote the possibility of self-employment after B.Sc.
Physics	<p>PSO1: The student develop good experimental technique, including proper setup and care of equipment, conducting experiments and analyzing results and make meaningful comparisons between experiment and theory</p> <p>PSO2: Develop deep understanding of the basics, fundamental & laws of physics like mechanics, optics, properties of matter, e-m theory, and environmental issues related to physics so that they can pursue higher studies.</p> <p>PSO3: Students completing this course will have understanding of matter through courses like solid state physics, atomic and molecular physics, nuclear physics etc.</p> <p>PSO4: Technical skills & Skills of computer software will be developed through practical course.</p> <p>PSO5: Design new devices and systems that correlate with the fundamental for innovative research program</p>

**BHARATIYA JAIN SANGHATANA'S ARTS, SCIENCE, COMMERCE
COLLEGE, WAGHOLI, PUNE -412 207**

COURSE OUTCOME ACADEMIC YEAR 2021-22

DEPARTMENT OF BACHELOR OF BUSINESS ADMINISTRATION IN COMPUTER APPLICATION

Course Title		
Business Communication		
CODE	CA - 101	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand what is the role of communication in personal and business world	K2
CO-2	To understand system and communication and their utility	K2
CO-3	To develop proficiency in how to write business letters and other communications	K3
CO-4	Apply the managerial functions in different business setup	K3
CO-5	Implement decisions to ensure organizational effectiveness	K3
Course Title		
Principles of Management		
CODE	CA - 102	
CO No.	Course Outcomes	Knowledge Level
CO-1	Interpret and design the different forms of organization	K3
CO-2	Demonstrate social responsibility and ethical issues involved in business situations and organizations	K4
CO-3	Integrate management principles in real time situations	K2
CO-4	Apply the managerial functions in different business setup	K3

CO-5	Implement decisions to ensure organizational effectiveness	K3
CourseTitle- C Programming		
CODE	CA - 103	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand the concept of Procedural Programming	K2
CO-2	To acquire basic programming skills using C Programming Language	K3
CO-3	Students will Improve logical thinking through practical knowledge of C Programming	K4
CO-4	By learning the basic programming constructs they can easily Switch over to any other language in future.	K4
Course Title	Database Management System	
CODE	CA - 104	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand role and importance File Structures and Organization	K2
CO-2	To develop skills related with Database basic Concepts.	K3
CO-3	To Develop right understanding of various Data models	K3
CO-4	To Understand the Programming in SQL and Implementation	K4
CO-5	To Learn about Relational Database Designing.	K3
Course Title	Statistics	
CODE	CA – 105	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand role and importance of statistics in various business situations	K2
CO-2	To develop skills related with basic statistical technique	K2
CO-3	Develop right understanding regarding regression, correlation and datainterpretation	K3
CourseTitle	Computer Laboratory Based on 103 &104	

CODE	CA – 106	
CO No.	Course Outcomes	Knowledge Level
CO-1	To assess the knowledge of student in C and DBMS	K3
CO-2	To acquire knowledge on writing computer programs using C Language	K4
CO-3	To create and manage Database using SQL	K4

CourseTitle

Principles of programming and algorithm

CODE	CA - 107	
CO No.	Course Outcomes	Knowledge Level
CO-1	To develop analytical /logical thinking and problem solving capabilities	K4
CO-2	To know the fundamentals of programming and designing.	K3
CO-3	To learn the algorithm analysis and notations	K3
CO-4	To understand the concept, problem and algorithm.	K1

CourseTitle

Organization Behavior & Human Resource Management

CODE	CA - 201	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand basic concept of HRM & OB	K1
CO-2	To know the major trends in HRM & OB	K2

CO-3	To make aware students about traditional & modern methods of procurement & development in organization	K3
CO-4	To make aware students about on the job & Off the Job Training methods	K4
Course Title Financial Accounting		
CODE	CA - 202	
CO No.	Course Outcomes	Knowledge Level
CO-1	To develop right understanding regarding role and importance of monetary and financial transactions in business	K1
CO-2	To cultivate right approach towards classifications of different transactions and their implications	K3
CO-3	To develop proficiency preparation of basic financial as to how to write basis accounting statement - Trading and P&L	K4
Course Title Business Mathematics		
CODE	CA - 203	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand role and importance of Mathematics in various business situations and while developing softwares.	K4
CO-2	To develop skills related with basic mathematical technique	K4
Course Title Relational database management System.		
CODE	CA - 204	
CO No.	Course Outcomes	Knowledge Level
CO-1	Enables students to understand relational database concepts.	K2
CO-2	Enables students to understand transaction management concepts in database system.	K2

CO-3	Enables student to write PL/SQL programs that use: procedure, function, package, cursor and trigger.	K3
CO-4	To Understand SQL/PLSQL the programming language of oracle	K4
CO-5	Get Fundamental Knowledge of subject in Brief along with Software.	K4

Course Title
Web Technology HTML-JS-CSS

CODE	CA - 205	
CO No.	Course Outcomes	Knowledge Level
CO-1	To know & understand concepts of internet programming.	K3
CO-2	To understand how to develop web based applications using JavaScript	K4

Course Title
Computer Laboratory Based on 204 & 205

CODE	CA - 206	
CO No.	Course Outcomes	Knowledge Level
CO-1	To assess the knowledge of student in RDBMS and Web Technology	K3
CO-2	To acquire knowledge on writing computer programs using concept of Web Technology	K4
CO-3	To create and manage Database using concept of RDBMS	K4

Course Title
Add On (Advance C)

CODE	CA - 207	
CO No.	Course Outcomes	Knowledge Level
CO-1	To study advanced concepts of programming using the 'C' Language.	K4

CO-2	To understand code organization with complex data types and structures.	K4
CO-3	To work with files.	K4
Course Title Digital Marketing		
CODE	CA-301	
CO No.	Course Outcomes	Knowledge Level
CO-1	The aim of this syllabus is to give knowledge about using digital marketing in and as business.	K3
CO-2	To make SWOT analysis, SEO optimization and use of various digital marketing tools.	K4
CO-3	To understand Case study and Exercise on various terms	K1
CO-4	To understand Digital marketing for business purpose	K2
Course Title Data Structure		
CODE	CA-302	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand the concept of ADT's.	K1
CO-2	To learn linear data structures – lists, stacks, and queues.	K2
CO-3	To understand sorting, searching and hashing algorithms.	K2
CO-4	To apply Tree and Graph structures.	K4
Course Title Software Engineering		
CODE	CA-303	

CO No.	Course Outcomes	Knowledge Level
CO-1	To understand system concepts.	K2
CO-2	To understand Software Engineering concepts.	K3
Course Title Basic Course in Environmental Awareness		
CODE	CA-307	
CO No.	Course Outcomes	Knowledge Level

Course Title	Ad-on Internet of Things (IoT)	
CODE	CA-507	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand Technical aspects of Internet of things.	K2
CO-2	To describe smart objects and IoT Architecture.	K3
CO-3	To study and compare different Application protocols of IoT.	K4
CO-4	To understand IoT platform using Arduino Uno.	K4
Course Title	Recent Trends in IT	
CODE	CA-601	
CO No.	Course Outcomes	Knowledge Level
CO-1	To discuss the basic concepts AI.	K2
CO-2	To apply basic, intermediate and advanced techniques to mine the data.	K4
CO-3	To provide an overview of the concept of Spark programming.	K4
Course Title	Software Testing	
CODE	CA-602	
CO No.	Course Outcomes	Knowledge Level
CO-1	Students will be introduced to testing tools.	K2
CO-2	Students will acquire Knowledge of Basic SQA.	K2
CO-3	Students will be able to design basic Test Cases.	K3
Course Title	Advanced Java	
CODE	CA-603	
CO No.	Course Outcomes	Knowledge Level
CO-1	Students will know the concepts of JDBC Programming.	K2
CO-2	Students will know the concepts of Multithreading and Socket Programming.	K2

CO-3	Students will know the concepts of Spring and Hibernate.	K3
CO-4	Students will develop the project by using JSP and JDBC.	K4
CO-5	Students will develop applications in Spring and hibernate	K4
Course Title	Android Programming	
CODE	CA-604	
CO No.	Course Outcomes	Knowledge Level
CO-1	To know the concept of Android Programming.	K2
CO-2	To understand the Android Operating System and develop applications using Google's Android open-source platform.	K3
CO-3	Student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.	K4
Course Title	Project	
CODE	605	
CO No.	Course Outcomes	Knowledge Level
CO-1	Students can express their ideas clearly and effectively, both verbally and in written form.	K4
CO-2	Students can work as a team to achieve common goals.	K4
CO-3	Students are able to make links across different areas of Knowledge and to generate, develop and evaluate ideas and information related to the project.	K4
CO-4	Students are able to learn on their own, reflect on their learning and improve upon it.	K4
Course Title	Computer Laboratory Based on 603 and 604	
CODE	606	
CO No.	Course Outcomes	Knowledge Level
CO-1	To assess the knowledge of student in Advanced Web Technologies and Advance Java	K4

CO-2	To acquire knowledge on writing computer programs using concept of Advanced Web Technologies and Advance Java	K4
CO-3	To create and manage Applications using Google's Android open-source platform.	K4
Course Title	Ad-on Soft Skill	
CODE	CA-607	
CO No.	Course Outcomes	Knowledge Level
CO-1	To understand Basic knowledge in communication and a good understanding of English.	K2
CO-2	Ready to adhere the new techniques.	K3
CO-3	To improve oral and written communication, teamwork, leadership, problem-solving and decision-making skills, to gain best results.	K4
CO-4	This course is useful for landing a great job, building a career and also finding employment as soft skills trainers.	K4

COURSE OUTCOME BACHELOR OF COMPUTER APPLICATION (BCA)

FY BCA SEM I		
Subject Code	Subject Name	Subject Outcome
101	Business Communication Skills	<ol style="list-style-type: none">1.It improves various skills of students such as linguistic, non-linguistic etc.2.Students learn the basic concepts of business communicationsuch as formal communication, informal communication etc.3. It enhances the students' ability to read, write, listen and speak effectively.4. Students observe and apply different Communication skills in day to day life.
102	Principle of Management	<ol style="list-style-type: none">1. Students learn the conceptual knowledge about nature, complexity, functions of management etc.2. Students understand the different aspects of principles of management given by different authors.3. Students learn the importance of management of change, crisis, TQM, Stress Management etc.4. It helps to apply Henry Fayol's principles in Day to day working life.
103	C Language	<ol style="list-style-type: none">1. Ability to improve logical thinking through practical knowledge of C Programming.2. Able to develop logic for writing programs using Control Structures, Arrays, and Functions.3. Able to develop small real-life applications using C.

104	Database Management System	<ol style="list-style-type: none"> 1. Ability to obtain the basic knowledge of Database Management Systems. 2. Able to gain knowledge of creation, manipulation and querying of data in databases. 3. Able to normalize the database design. 4. Able to develop an E-R model based on user requirements.
105	Statistics	<ol style="list-style-type: none"> 1. Students learn the basic concepts of statistics. 2. Students understand to calculate various types of averages and variation. 3. Students understand how the different statistical concepts can be applied in different industries differently. 4. It inculcates the research culture among
106	Computer Laboratory based on CA-103 and CA-104	<ol style="list-style-type: none"> 1. Ability to develop and implement computer programs using C Language. 2. Able to create and manipulate databases using SQL. 3. Understand how to write, debug and execute simple programs in C.

**FY BCA SEM
II**

Subject Code	Subject Code	Subject Code
201	Organization Behavior and Human Resource Management	<ol style="list-style-type: none"> 1. Ability to develop strategies for organizational change and development. 2. Able to make aware students of traditional & modern methods of procurement & development in the organization. 3. Able to explore the major trends in HRM & OB.

202	Financial Accounting	<ol style="list-style-type: none"> 1. Ability to develop skills for basic accounting. 2. The course will impart knowledge on transaction management and record-keeping. 3. Cultivate the right approach towards classifications of different transactions and their implications. 4. Develop proficiency in the preparation of basic financial and accounting statements.
203	Business Mathematics	<ol style="list-style-type: none"> 1. Ability to analyze and interpret mathematical results. 2. To understand the role and importance of Mathematics in various business situations and while developing software.
204	Relational Database	<ol style="list-style-type: none"> 1. Able to acquire a good formal foundation on the relational model of data and usage of Relational Databases. 2. Able to use advanced database Programming concepts. 3. Enables the student to write PL/SQL programs that use procedure, function, package, cursor and trigger.
205	Web Technology HTML- JavaScript-CSS	<ol style="list-style-type: none"> 1. Ability to design more attractive Web pages using CSS. 2. Ability to develop interactive websites using JavaScript. 3. Understand how to develop web-based applications using JavaScript.
206	Computer Laboratory Based on 204 and 205	<ol style="list-style-type: none"> 1. Able to manage relational databases using SQL. 2. Ability to write simple and nested queries using SQL. 3. Ability to write PL/SQL programs that use procedure, function, package, cursor, and trigger. 4. Ability to design web pages using HTML, CSS and JavaScript

SY BCA SEM III		
Sub Code	Subject Code	Subject Code
301	Digital Marketing	<ol style="list-style-type: none"> 1. Familiarity with working of E-Commerce and understand B-B, C-B, C-Relationship. 2. Able to understand the basics of SEO (Search Engine Optimization) and better understanding between Digital and Real Marketing. 3. Understanding of Digital Marketing types and gaining practical knowledge of its usage through the Internet, Social Media and Mobile, Email. Designing effective content for digital marketing using various Digital Marketing tools. 4. Developing an effective marketing strategy using CRM.
302	Data Structure	<ol style="list-style-type: none"> 1. Able to understand the concepts of ADTs. 2. Develop skills in the implementation and application of different types of data structures. 3. To understand basic algorithms related to sorting, searching and hashing. 4. To understand the concept of different memory allocation techniques. 5. Apply algorithm and data structure in various real-life software problems.
303	Software Engineering	<ol style="list-style-type: none"> 1. Able to understand concepts of Systems and their types. 2. Able to understand software engineering concepts and their applications. 3. Develop the ability to gain knowledge of the SDLC process. 4. Ability to understand the concept of Re-Engineering and Reverse Engineering. 5. Knowledge of different types of software development models such as waterfall, spiral, and prototyping. 6. Understand the concept of testing and its types.

304	PHP	<ol style="list-style-type: none"> 1. Ability to develop interactive data-driven dynamic websites. 2. Understand how server-side programming works on the web. 3. To understand Session and Cookie concept. 4. To implement database connectivity.
305	Angular JS	<ol style="list-style-type: none"> 1. Empower students to create a web application that depends on Client-Side MVC & SPA. 2. To study the use of various AngularJS Components. 3. Ability to understand the concepts of Javascript and its implementation. 4. Create and bind controllers with Javascript and apply the filter in the Angular JS application.
306	Big Data	<ol style="list-style-type: none"> 1. Able to understand the basic techniques such as R programming that form the foundations of Big Data. 2. Ability to acquire knowledge in specialized aspects of big data including big data applications and big data analytics. 3. To understand the building blocks of Big Data and specialized aspects of big data with the help of different big data applications. 4. Explore the area of specialization in Data Science and be able to represent the analytical aspects of Big Data. 5. Able to summarize data using exploratory data analysis and visualization using graphs.
306	Blockchain	<ol style="list-style-type: none"> 1. Understand what and why of Blockchain. 2. Explore the major components of Blockchain. 3. Learn about Bitcoin, Cryptocurrency and Ethereum. 4. Deploy and exercise example smart contracts. 5. Identify a use case for a Blockchain application. 6. Create your Blockchain network application.

SY BCA SEM IV		
Subject Code	Subject Code	Subject Code
401	Networking	<ol style="list-style-type: none"> 1. Obtain knowledge about Computer Network concepts. 2. Gain Knowledge about working of networking models, addresses, transmission media and Connectivity devices. 3. To acquire information about network security and cryptography.
402	Object- Oriented Concepts through CPP	<ol style="list-style-type: none"> 1. Acquire an understanding of basic object-oriented concepts and the issues involved in effective class design. 2. Develop programming skills using C++ features. 3. Able to use various object-oriented concepts used to solve real-life problems. 4. Implement different concepts of file handling and exception handling.
403	Operat ing Syst em	<ol style="list-style-type: none"> 1. Understand fundamental operating system abstraction such as process, semaphore, thread etc. 2. To know the services provided by Operating System. 3. Analyze process scheduling, CPU Scheduling, and memory management algorithms. 4. To understand design issues related to file management and various related algorithms.
404	Node – JS	<ol style="list-style-type: none"> 1. Understand the JavaScript and technical concepts behind Node JS. 2. Structure a Node application in modules. 3. Understand and use the Event Emitter, Buffers, Streams and Pipes. 4. Build a Web Server in Node and understand how it works. 5. Ability to understand how to connect with SQL or Mongo database in Node.

405	Advance PHP	<ol style="list-style-type: none"> 1. To know & understand concepts of internet programming. 2. Understand how server-side programming works on the web. 3. Able to understand how to use PHP Frameworks like (Joomla / Drupal)
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TYBCA SEM V		
Subject Code	Subject Code	Subject Code
501	Cyber Security	<ol style="list-style-type: none"> 1. Have a good understanding of CyberSecurity and the Tools. 2. To acquire basic information on CyberSecurity and Cybercrime. 3. Have a good understanding of Cyber laws. 4. To develop Cyber forensics awareness. 5. Identify attacks, security policies and credit card frauds in the mobile and Wireless Computing Era.
502	Object-Oriented Software Engineering	<ol style="list-style-type: none"> 1. Able to give Design Specifications for Project. 2. Acquire Knowledge in Basic Modeling. 3. Ability to acquire Project Management Skills. 4. Able to understand the fundamentals of object modeling 5. Design different UML diagrams. 6. Improve the software design with design patterns. 7. To test the software against its requirements specification.
503	Core Java	<ol style="list-style-type: none"> 1. Able to solve real-world problems using OOP techniques. 2. Able to solve problems using java collection framework and I/O classes 3. Develop applets for web applications. 4. Design GUI-based applications. 5. Ability to understand the use of

		fileconcepts.
504	MongoDB	<ol style="list-style-type: none"> 1. Ability to work with MongoDB shell and MongoDB tools. 2. Able to do Schema design, Data modeling, and all sorts of CRUD Operations. 3. Able to apply various techniques to optimize query performance. 4. Analyze the data stored in MongoDB.
504	Python	<ol style="list-style-type: none"> 1. Understand the need and importance of Python language. 2. Able to learn how to design and implement Python applications. 3. Design and implement a program to solve a real-world problem 4. Design and implement GUI application 5. Gain knowledge of handling the concepts of exceptions and files.
505	(DSE) Project	<ol style="list-style-type: none"> 1. Undertake problem identification, formulation and solution. 2. Understand project characteristics and various stages of project development. 3. Design solutions to complex problems. 4. Gain a sound technical knowledge of selected project development platforms. 5. Develop and enhance coding skills.

506	Computer Laboratories Based on (503 and 504) (2 credits each)	<ol style="list-style-type: none"> 1. Define and demonstrate the use of GUI Programming concepts. 2. Design and implement a program to solve a real-world problem. 3. Design and implement classes and methods. 4. Implementation of exception handling using packages. 5. Define and demonstrate web-based applet applications.
TYBCA SEM VI		
SubCode	Subject Code	Subject Code
601	Recent Trends in IT	<ol style="list-style-type: none"> 1. Able to understand basic concepts of AI. 2. To apply basic, intermediate and advanced techniques to mine the data. 3. To provide an overview of the concept of Spark programming.
602	Software Testing	<ol style="list-style-type: none"> 1. Acquire knowledge of testing tools. 2. Understand the basic concepts of SQA. 3. Able to design and implement the basic Test Cases.
603	Advanced Java	<ol style="list-style-type: none"> 1. Able to understand the concepts of JDBC Programming, Multithreading and Socket Programming. 2. Ability to understand the concepts of spring and Hibernate, JSP and JDBC. 3. Develop applications in spring and hibernate. 4. Design website by using JDBC and JSP. 5. Develop different types of Servlet applications.
604	Android Programming	<ol style="list-style-type: none"> 1. Able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more. 2. Demonstrate their understanding of the fundamentals of Android operating systems. 3. Demonstrate their skills in using Android software development tools.
604	Dot Net Framework	<ol style="list-style-type: none"> 1. Understand the features of Dot Net Framework, VB, C#, and ASP. 2. Design and develop window-based and web-based .NET applications. 3. Design and develop a Website. 4. Design and Implement database connectivity using ADO.NET for VB, C#, and ASP.

605	(DSE) Project	<ol style="list-style-type: none"> 1. Acquire Project development and management skills. 2. Able to implement design and coding techniques. 3. Students will be able to apply test cases and testing techniques in the project.
606	Computer Laboratory Based on 603 and 604 (2 credits each)	<ol style="list-style-type: none"> 1. Ability to develop different types of chatting applications by using Socket programming. 2. Able to develop and design different types of websites. 3. Able to develop the project by using spring and Hibernate. 4. To Understand Applications of widgets and components.

<p><u>Geography</u></p>	<ol style="list-style-type: none"> a. Students of all undergraduate general degree programs should have acquired the following abilities/ values at the time of graduation: b. Define and develop the interdisciplinary approach through the study of Geography c. Enhance employability and entrepreneur skills among the students. d. Demonstrate and appreciate the importance of diverse cultural, economic, regional, and resources perspective. e. Realization the importance of relation between Geography and various branches of Humanities, mental moral sciences. f. Demonstrate and understand the important concept and theories in the field of Geography. Subject specific g. Demonstrate knowledge of physical and cultural features of the earth surface. h. Define basic disciplines of Geography and its sub branches. i. Discuss the basic concepts and terminologies used in Geography like interior of the earth, plate tectonic, sea floor spreading, population growth, disasters, composition and structure of atmosphere, hydrosphere, etc.
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	<p>j. Distinguish between minerals and rocks, weather and climate, interior of the earth, basic industries, farming etc.</p> <p>k. Describe the causes and effects of local, national and international problems like global warming, acid rain, ozone depletion, soil degradation, deforestation etc. Institutional</p> <p>l. Encourage to develop overall personality with soft skills and vocational competence among the students</p> <p>m. Enhance and rediscover knowledge skills and holistic approach towards life.</p>
<u>Hindi</u>	<p>छात्रों को काव्य सहित्य से परिचित कराना</p> <ul style="list-style-type: none"> ➤ छात्रों को कहानी सहित्य से परिचित कराना ➤ सर्जनात्माकता का विकास कराना ➤ छात्रों की मूल्यांकन की क्षमता बढ़ाना ➤ छात्रों को सरकारी पत्र लेखन से अवगत कराना ➤ छात्रों को संस्मरण सहित्य से अवगत कराना ➤ छात्रों को रेखाचित्र सहित्य से अवगत कराना ➤ छात्रों को गजल सहित्य से अवगत कराना ➤ छात्रों को हिंदी साहित्य लेखन से परिचित कराना ➤ छात्रों को भाषाविज्ञान का परिचित कराना ➤ छात्रों को भाषाविज्ञान के स्वरूप क परिचय देना ➤ छात्रों को स्क्रीप्ट परिचय कराना ➤ छात्रों को कथा,पटकथा और संवाद से परिचित कराना
<u>ECONOMICS</u>	<ol style="list-style-type: none"> 1. To familiarize with fundamentals of modern financial system. 2. To help the students to prepare for varied competitive examinations. 3. To familiarize students with various concepts of national income. 4. To introduce students to the role of money in an economy. 5. To facilitate the development of research aptitude in students.
Marathi	मराठी साहित्य : कथा आणि भाषिक कौशल्य विकास
F.Y.B.A.	The Students Who Successfully Completes this Course students will

	be able to ..
	१) जीवनविषयक जाणीव विकसित होईल
	२) समकालीन मराठी कथाविश्व आकलन होण्यास मदत होईल.
	३) व्यक्तिमत्व विकासामध्ये भाषेचे महत्व लक्षात येईल.
	४) जागतिकीकरणाच्या स्पर्धेत भाषिक क्षमता विकसित होईल.
मराठी साहित्य : एकांकिका आणि भाषिक कौशल्यविकास	
	The Students Who Successfully Completes this Course students will be able to ..
	१) एकांकिका या साहित्यप्रकाराची ओळख करून देणे.
	२) एकांकिका या साहित्य प्रकाराचे स्वरूप घटक आणि प्रकार यांची ओळख करून देणे.
	३) मराठी साहित्यातील निवडक एकांकिकाचे अध्ययन करणे.
	४) भाषिक कौशल्यांचा विकास करणे.
S. Y. B. A.	23023 General-2 (CC-1A) Marathi Third Semester
	भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्यप्रकार : कादंबरी
	The Students Who Successfully Completes this Course students will be able to ..
	१) कादंबरी या साहित्य प्रकाराचे स्वरूप घटक प्रकार आणि वाटचाल समजून घेणे.
	२) नेमलेल्या कादंबरीचे आकलन आस्वाद आणि विश्लेषण करणे.
	३) भाषिक कौशल्य विकास करणे.
	४) नव तंत्रज्ञानाचा अभ्यास करणे.
S. Y. B. A.	24023 General-2 (CC-1F) Marathi Third Semester
	भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्यप्रकार : ललितगद्य
	The Students Who Successfully Completes this Course students will

	be able to ..
	१)ललित गद्य साहित्य प्रकाराचे स्वरूप घटक प्रकारांनी वाटचाल समजून घेणे.
	२)नेमलेल्या अभ्यास पुस्तकातील ललित गद्य याचे आकलन आणि विश्लेषण करणे.
	३)भाषिक कौशल्य विकसित करणे.
	४)गुगल साधनांचा अध्ययनात वापर करणे.
T.Y.B.A.	35023 General-3 CC-1E (3) Marathi Fifth Semester
	भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्यप्रकार : प्रवासवर्णन
	The Students Who Successfully Completes this Course students will be able to ..
	१) मुद्रित माध्यमांसाठी लेखन कौशल्य आत्मसात करणे.
	२) प्रवास वर्णन या साहित्यप्रकाराचे स्वरूप प्रेरणा प्रयोजन आणि वैशिष्ट्ये समजून घेणे.
	३) तीन मुलांचे चार दिवस या पुस्तकाचे आधुनिक काळातील महत्त्व समजून घेणे.
	४) नेमलेल्या प्रवास वर्णनाचे आकलन आस्वाद आणि विश्लेषण करणे.
T.Y.B.A.	36023 General-3 CC-1F (3) Marathi Sixth Semester
	भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्यप्रकार : कविता
	The Students Who Successfully Completes this Course students will be able to ..
	१) मराठी साहित्य कौशल्य विकास आणि शासन व्यवहार यांची ओळख करून देणे.

	२) राज्यघटनेतील भाषा विषयक तरतुदी माहीत करून घेणे.
	३) नेमलेल्या अभ्यास पुस्तकातील निवडक कवितांचे आकलन आस्वाद आणि मूल्यमापन करणे.
	४) मराठी कविता प्रेरणा प्रवृत्ती स्वरूप व वाटचाल समजून घेणे.

S.Y.B.A. 23021 Special-1 (DSC-1C) Marathi Third Semester

आधुनिक मराठी साहित्य : प्रकाशवाटा

	The Students Who Successfully Completes this Course students will be able to ..
	१)मराठीतील आत्मचरित्र साहित्य प्रकारांच्या तात्विक घटकांचे ज्ञान करून देणे.
	२)साहित्यकृतीची आकलन आस्वाद आणि मूल्यमापन करण्याची दृष्टी निर्माण करणे.
	३)ललित गद्यातील अन्य साहित्य प्रकारांच्या तुलनेत आत्मचरित्राचे वेगळेपण समजावून घेणे.
	४)नेमलेल्या आत्मचरित्राचे आकलन आस्वाद आणि विश्लेषण करणे.

S.Y.B.A. 23021 Special-1 (DSC-1C) Marathi Third Semester

मध्ययुगीन मराठी साहित्य : निवडक मध्ययुगीन गद्य,पद्य

	The Students Who Successfully Completes this Course students will be able to ..
	१) मध्ययुगीन गद्य-पद्य साहित्य प्रकारांची ओळख करून घेणे.
	२) नेमलेल्या अभ्यास पुस्तकातील मध्ययुगीन गद्य, पद्य साहित्याचे आकलन, आस्वाद, आणि विश्लेषण करणे
	३)मध्ययुगीन कालखंडातील प्रेरणा व प्रवृत्तींचा अभ्यास करणे.

	४)मध्ययुगीन कालखंडातील साहित्याच्या भाषेचा अभ्यास करणे.		
S.Y.B.A.	24024	Special-2 (DSC-2B(3))	Marathi Fourth Semester
	साहित्यविचार		
	The Students Who Successfully Completes this Course students will be able to ..		
	१) भारतीय आणि पाश्चात्य साहित्याच्या आधारे साहित्याची संकल्पना, स्वरूप आणि प्रयोजन विचार समजून घेणे.		
	२) साहित्याची निर्मिती प्रक्रिया समजावून घेणे.		
	३) साहित्याची भाषा आणि शैली विषय विचार समजावून घेणे.		
	४) साहित्याची सामाजिकता समजावून घेणे.		
S.Y.B.A.	24024	Special-2 (DSC-2B(3))	Marathi Fourth Semester
	साहित्य समीक्षा		
	The Students Who Successfully Completes this Course students will be able to ..		
	१) साहित्यसमीक्षा ची संकल्पना, स्वरूप यांचा परिचय करून घेणे.		
	२) साहित्य आणि समीक्षा यांचे परस्पर संबंध समजावून घेणे.		
	३) साहित्य प्रकारानुसार समीक्षेचे स्वरूप समजावून घेणे.		
	४) विविध समीक्षा पद्धतीचा अभ्यास करणे.		
S.Y.B.A.	23011	MIL2	Marathi Third Semester
	मराठी भाषिक संज्ञापनकौशल्ये		
	The Students Who Successfully Completes this Course students will be able to ..		
	१) भाषा व व्यक्तिमत्व विकास यांचा सहसंबंध समजून घेणे.		
	२) प्रसारमाध्यमांसाठी संज्ञापन कौशल्य अवगत करणे.		
	३) मुद्रित शोधनाची कला अवगत करणे.		
	४) बातमीचे महत्व आणि स्वरूप समजून घेणे.		

S.Y.B.A.	24024 MIL2	Marathi Fourth Semester
	नवसमाजमाध्यमे आणि समाज माध्यमांसाठी मराठी	
	The Students Who Successfully Completes this Course students will be able to ..	
	१) भाषा व जीवन व्यवहार यांचा सहसंबंध समजून घेणे.	
	२) नवसमाज माध्यमांविषयी जागरूकता निर्माण करणे.	
	३) व्यावसायिक पत्रव्यवहार समजून घेणे.	
	४) समाज माध्यमांचे महत्व आणि परिणाम समजून घेणे.	
S.Y.B.A.	23025 SEC 2A	Marathi Third Semester
	प्रकाशन व्यवहार आणि संपादन	
	The Students Who Successfully Completes this Course students will be able to ..	
	1) प्रकाशन व्यवहार आणि संपादन यांचे उपयोजन समजून घेणे.	
	2) ग्रंथ निर्मिती प्रक्रिया समजून घेणे.	
	3) सहिता संपादन समजून घेणे.	
	4) प्रकाशन संस्था व जाहिरात यांचे स्वरूप व व्यवहार यांची ओळख करून घेणे.	
S.Y.B.A.	24025 SEC2D	Marathi Fourth Semester
	उपयोजित लेखनकौशल्ये	
	The Students Who Successfully Completes this Course students will be able to ..	
	१) जाहिरात, मुलाखत लेखन अन्न आणि संपादन यासाठी आवश्यक कौशल्य मिळविणे.	
	२) दृकश्राव्य माध्यमांचा साठी मुलाखत कौशल्य अवगत करणे.	
	३) जाहिरात, मुलाखत लेखन आणि संपादन यासाठी आवश्यक उपयोजन कौशल्य मिळविणे.	

	४) माहितीपर नोंदीची ओळख करून घेणे.
T. Y. B. A.	36021 Special-3 DSE-1C Marathi Fifth Semester
	मध्ययुगीन मराठी वांगमयाचा इतिहास : प्रारंभ ते इ.स.१६००
	The Students Who Successfully Completes this Course students will be able to ..
	१) साहित्य इतिहासाची संकल्पना स्वरूप प्रेरणा-प्रवृत्ती समजून घेणे.
	२) मध्ययुगीन कालखंडाची सामाजिक सांस्कृतिक पार्श्वभूमी समजून घेणे.
	३) मराठी भाषा साहित्याची कालखंडानुसार विभागणी करणे व इतिहास समजून घेणे.
	४) मध्ययुगीन कालखंडातील विविध साहित्य प्रकारांचा अभ्यास करणे.
T. Y. B. A.	3602१ Special-3 DSE-1D Marathi Sixth Semester
	मध्ययुगीन मराठी वांगमयाचा इतिहास ई.स.१६०१ ते १८१७
	The Students Who Successfully Completes this Course students will be able to ..
	१) शिवकाल आणि पेशवे काळातील वांगमयीन प्रेरणा-प्रवृत्ती स्वरूप समजून घेणे.
	२) संत तुकाराम, संत रामदास, अनंत फंदी, मोरोपंत, रामजोशी, प्रभाकर इत्यादी संत पंडित व शाहीर कवींचे योगदान अभ्यासणे.
	३) बखर वांगमय प्रेरणा-प्रवृत्ती स्वरूप समजून घेणे.
T. Y. B. A.	335022 Special-4 DSE-2C Marathi Fifth Semester
	वर्णनात्मक भाषाविज्ञान भाग-१

	The Students Who Successfully Completes this Course students will be able to ..
	१) भाषा स्वरूप वैशिष्ट्ये व कार्य समजावून घेणे.
	२) भाषा अभ्यासाची आवश्यकता स्पष्ट करणे.
	३) भाषा अभ्यासाच्या शाखा आणि विविध पद्धतींचा थोडक्यात परिचय करून घेणे.
	४) वाघ इंद्रियाची रचना कार्य आणि सौंग निर्मितीची प्रक्रिया समजावून घेणे
	५) सभासद बखर, शिवछत्रपतींचे सप्त प्रकरण आत्मचरित्र, भाऊसाहेबांची बखर, पानिपत बखर आज्ञापत्र अभ्यासणे

T.Y.B.A. 36022 Special-4 DSE-2D Marathi Sixth Semester

वर्णनात्मक भाषाविज्ञान भाग-2

	The Students Who Successfully Completes this Course students will be able to ..
	१) रूप विण्यास आणि मराठीचिऋपट व्यवस्था समजावून घेणे.
	२) वाक्य विण्यास आणि मराठी भाषेचे संदर्भात वाक्य व्यवस्थेचा परिचय करून देणे.
	३) अर्थ विणण्यास या संकल्पनेचा भाषा विज्ञानाच्या अंगाने परिचय करून देणे.
	४) क्षेत्रभेटीचे व संशोधन प्रकल्पाचे महत्त्व सांगणे

T.Y.B.A. 35025 SEC 2C Marathi Fifth Semester

कार्यक्रम संयोजनातील भाषिक कौशल्य भाग-१

	The Students Who Successfully Completes this Course students will be able to ..
	१) कार्यक्रमाचे स्वरूप व प्रकार समजून घेणे.
	२) कार्यक्रम संयोजन आतील भाषिक कौशल्य अवगत करणे.
	३) कार्यक्रम नियोजन, सूत्रसंचालन यांची कौशल्य मिळविणे.

	४) आयोजक, प्रायोजक, जाहिरातदार, निवेदक यांचे कार्य व महत्व समजून घेणे.
T.Y.B.A.	36025 SEC 2D Marathi Sixth Semester
	कार्यक्रम संयोजनातील भाषिक कौशल्य भाग-२
	The Students Who Successfully Completes this Course students will be able to ..
	१) कार्यक्रम संयोजन आतील लेखन कौशल्य संपादन करणे.
	२) आभासी कार्यक्रम संयोजन अवगत करणे.
	३) निमंत्रण पत्रिका, मानपत्र लेखन, अहवाल लेखन कौशल्य समजून घेणे.
	४) कवी संमेलन, मराठी भाषा दिन, पुस्तक प्रदर्शन इत्यादी कार्यक्रमांचे यशस्वी संयोजन करणे.

Department of Chemistry
CBCS Pattern 2019 (SPPU)
COURSE OUTCOME

Under Graduate (FYBSc, SYBSc and TYBSc)

Name of the Subject- Chemistry	
FY BSc - text for each subject	<p>Student will be able to:</p> <ol style="list-style-type: none"> 1. Students will be able to apply thermodynamic principles to physical and chemical process 2. Calculations of enthalpy , Bond energy, Bond dissociation energy , resonance energy 3. Variation of enthalpy with temperature –Kirchoff’s equation 4. Third law of thermodynamic and its application 5. Relation between Free energy and equilibrium and factors affecting on equilibrium constant. 6. Exergonic and endergonic reaction 7. Gas equilibrium, equilibrium constant and molecular interpretation of equilibrium constant 8. Van’t Haff equation and its application 9. Concept to ionization process occurred in acids, bases and pH scale 10. Related concepts such as Common ion effect hydrolysis constant, ionic product, solubility product 11. Degree of hydrolysis and pH for different salts , buffer solutions 12. After completing the course work learner will be acquired with knowledge of chemical energetics, Chemical equilibrium and ionic equilibria.
CH-102 Organic Chemistry	<ol style="list-style-type: none"> 1. The students are expected to understand the fundamentals, principles, and recent developments in the subject area. 2. It is expected to inspire and boost interest of the students towards chemistry as the main subject. 3. To familiarize with current and recent developments in Chemistry. 4. To create foundation for research and development in

<p>CH-103 Chemistry Practicals Course –I</p>	<p>Chemistry</p> <p>5. Students will learn Fundamentals of organic chemistry, stereochemistry (Conformations, configurations and nomenclatures) and functional group approach for aliphatic hydrocarbons.</p> <p>1. Importance of chemical safety and Lab safety while performing experiments in laboratory</p> <p>2. Determination of thermochemical parameters and related concepts</p> <p>3. Techniques of pH measurements</p> <p>4. Preparation of buffer solutions</p> <p>5. Elemental analysis of organic compounds (non instrumental)</p> <p>6. Chromatographic Techniques for separation of constituents of mixtures</p> <p>7. Students will learn quantum mechanical approach to atomic structure, Periodicity of elements, various theories for chemical bonding.</p> <p>8. The practical course is in relevance to the theory courses to improve the Understanding of the concepts.</p> <p>9. It would help in development of practical skills of the students.</p> <p>10. Use of microscale techniques wherever required</p>
<p>CH-201 Inorganic Chemistry</p>	<p>1. Various theories and principles applied to reveal atomic structure</p> <p>2. Origin of quantum mechanics and its need to understand structure of hydrogen atom</p> <p>3. Schrodinger equation for hydrogen atom</p> <p>4. Radial and angular part of hydrogenic wave functions</p> <p>5. Significance of quantum numbers</p> <p>6. Shapes of orbitals</p> <p>7. Explain rules for filling electrons in various orbitals- Aufbau's</p>

	<p>principle, Pauli exclusion principle, Hund's rule of maximum multiplicity</p> <p>8. Discuss electronic configuration of an atom and anomalous electronic configurations.</p> <p>9. Describe stability of half-filled and completely filled orbitals.</p> <p>10. Discuss concept of exchange energy and relative energies of atomic orbitals</p> <p>11. Design Skeleton of long form of periodic table.</p> <p>12. Describe Block, group, modern periodic law and periodicity.</p> <p>13. Classification of elements as main group, transition and inner transition elements</p> <p>14. Write name, symbol, electronic configuration, trends and properties.</p> <p>15. Explain periodicity in the following properties in details:</p> <ul style="list-style-type: none">a. Effective nuclear charge, shielding or screening effect; some numerical problems.b. Atomic and ionic size.c. Crystal and covalent radiid. Ionization energiese. Electronegativity- definition, trend, Pauling electronegativity scale.f. Oxidation state of elements <p>16. Attainment of stable electronic configurations.</p> <p>17. Define various types of chemical bonds- Ionic, covalent, coordinate and metallic bond</p> <p>18. Explain characteristics of ionic bond, types of ions, energy consideration in ionic bonding, lattice and solvation energy and their importance in the context of stability and solubility of ionic compounds</p> <p>19. Summarize Born-Landé equation and Born-Haber cycle,</p> <p>20. Define Fajan's rule, bond moment, dipole moment and percent ionic character.</p> <p>21. Describe VB approach, Hybridization with example of linear,</p>
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**CH-202 Analytical
Chemistry**

trigonal, square planer, tetrahedral,

TBP, and octahedral.

22. Discuss assumption and need of VSEPR theory.

23. Interpret concept of different types of valence shell electron pairs and their contribution in bonding.

24. Application of non-bonded lone pairs in shape of molecule

25. Basic understanding of geometry and effect of lone pairs with examples such as ClF_3 , Cl_2O , BrF_5 ,

XeO_3 and XeOF_4 .

26. Students will know about basics of analytical chemistry, some techniques of analysis and

able to do calculations essential for analysis.

1. Analytical Chemistry –branch of chemistry

2. Perspectives of analytical Chemistry

3. analytical problems

4. Calculations of mole, molar concentrations and various units of concentrations which will be

helpful for preparation of solution

5. Relation between molecular formula and empirical formula

6. Stoichiometric calculation

7. Define term mole, millimole, molar concentration, molar equilibrium concentration and Percent

Concentration.

8. SI units, distinction between mass and weight

9. Units such as parts per million, parts per billion, parts per thousand, solution-dilatant volume ratio,

function density and specific gravity of solutions

Basics of type determination, characteristic tests and classifications, reactions of different functional

groups.

<p>CH- 203: Chemistry Practical –II</p>	<ol style="list-style-type: none"> 10. Separation of binary mixtures and analysis 11. Elemental analysis -Detection of nitrogen, sulfur, halogen and phosphorous by Lassaigne's test. 12. Purification techniques for organic compounds. 13. Basics of chromatography and types of chromatography 14. Theoretical background for Paper and Thin Layer Chromatography 15. pH meter and electrodes for pH measurement 16. Measurement of pH 17. Working of pH meter 18. Applications of pH meter <ol style="list-style-type: none"> 1. Inorganic Estimations using volumetric analysis 2. Synthesis of Inorganic compounds 3. Analysis of commercial products 4. Purification of organic compounds 5. Preparations and mechanism of reactions involved 6. The practical course is in relevance to the theory courses to improve the Understanding of the concepts. 7. It would help in development of practical skills of the students. 8. Use of microscale techniques wherever required
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SYBSc - text for each subject

Name of the Subject	Course Outcome
<p>CH-301 Physical and Analytical Chemistry</p>	<ol style="list-style-type: none"> 1. Define / Explain concept of kinetics, terms used, rate laws, molecularity, order. 2. Explain factors affecting rate of reaction. 3. Explain / discuss / derive integrated rate laws, characteristics, expression for half-life and examples of zero order, first order, and second order reactions.

4. Determination of order of reaction by integrated rate equation method, graphical method, half-life method and differential method.
5. Explain / discuss the term energy of activation with the help of energy diagram.
6. Explanation for temperature coefficient and effect of temperature on rate constant k.
7. Derivation of Arrhenius equation and evaluation of energy of activation graphically.
8. Derivations of collision theory and transition state theory of bimolecular reaction and comparison.
9. Solve / discuss the problem based applying theory and equations.
10. Define / explain adsorption, classification of given processes into physical and chemical adsorption.
11. Discuss factors influencing adsorption, its characteristics, differentiates types as physisorption and Chemisorption
12. Classification of Adsorption Isotherms, to derive isotherms.
13. Explanation of adsorption results in the light of Langmuir adsorption isotherm, Freundlich's adsorption Isotherm and BET theory.
14. Apply adsorption process to real life problem.
15. Solve / discuss problems using theory.
16. Define, explain and compare meaning of accuracy and precision.
17. Apply the methods of expressing the errors in analysis from results.
18. Explain / discuss different terms related to errors in quantitative analysis.
19. Apply statistical methods to express his / her analytical results in laboratory.
20. Solve problems applying equations
21. Explain / define different terms in volumetric analysis such as units of concentration, indicator, equivalence point, end point, standard solutions, primary and secondary standards, complexing agent, precipitating agent, oxidizing agent, reducing agent, redox indicators, acid base indicators, metallochrome indicators, etc.
22. Perform calculations involved in volumetric analysis.
23. Explain why indicator show colour change and pH range of colour change.
24. To prepare standard solution and **b.** perform standardization of solutions.
25. To construct acid – base titration curves and performs choice of indicator for particular titration.
26. Explain / discuss acid-base titrations, complexometric titration / precipitation titration / redox titration.
27. Apply volumetric methods of analysis to real problem in analytical

	chemistry / industry
CH-302 Inorganic and Organic Chemistry	<ol style="list-style-type: none"> 1. Define terms related to molecular orbital theory (AO, MO, sigma bond, pi bond, bond order, magnetic property of molecules, etc). 2. Explain and apply LCAO principle for the formation of MO's from AO's. 3. Explain formation of different types of MO's from AO's. 4. Distinguish between atomic and molecular orbitals, bonding, anti-bonding and non-bonding molecular orbitals. 5. Draw and explain MO energy level diagrams for homo and hetero diatomic molecules. Explain bond order and magnetic property of molecule. 6. Explain formation and stability of molecule on the basis of bond order. 7. Apply MOT to explain bonding in diatomic molecules other than explained in syllabus. 8. Define different terms related to the coordination chemistry (double salt, coordination compounds, coordinate bond, ligand, central metal ion, complex ion, coordination number, magnetic moment, crystal field stabilization energy, types of ligand, chelate effect, etc.) 9. Explain Werner's theory of coordination compounds. Differentiate between primary and secondary valency. Correlate coordination number and structure of complex ion. 10. Apply IUPAC nomenclature to coordination compound. 11. Identify and draw the structures aromatic hydrocarbons from their names or from structure name can be assigned. 12. Explain / discuss synthesis of aromatic hydrocarbons. 13. Give the mechanism of reactions involved. 14. Explain / Discuss important reactions of aromatic hydrocarbon. 15. To correlate reagent and reactions 16. Identify and draw the structures alkyl / aryl halides from their names or from structure name can be assigned. 17. Explain / discuss synthesis of alkyl / aryl halides. 18. Write / discuss the mechanism of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. 19. Explain / Discuss important reactions of alkyl / aryl halides. 20. To correlate reagent and reactions. 21. Give synthesis of expected alkyl / aryl halides. 22. Identify and draw the structures alcohols / phenols from their names or from structure name can be assigned. 23. Able to differentiate between alcohols and phenols 24. Explain / discuss synthesis of alcohols / phenols. 25. Write / discuss the mechanism of various reactions involved. 26. Explain / Discuss important reactions of alcohols / phenols. 27. To correlate reagent and reactions of alcohols / phenols 28. Give synthesis of expected alcohols / phenols.

<p>CH-303 Practical Chemistry</p>	<ol style="list-style-type: none"> 1. Verify theoretical principles experimentally. 2. Interpret the experimental data on the basis of theoretical principles. 3. Correlate theory to experiments. Understand/verify theoretical principles by experiment observations; explain practical output / data with the help of theory. 4. Understand systematic methods of identification of substance by chemical methods. 5. Write balanced equation for the chemical reactions performed in the laboratory. 6. Perform organic and inorganic synthesis and is able to follow the progress of the chemical reaction by suitable method (colour change, ppt. formation, TLC). 7. Set up the apparatus / prepare the solutions - properly for the designed experiments. 8. Perform the quantitative chemical analysis of substances explain principles behind it. 9. Systematic working skill in laboratory will be imparted in student.
<p>CH-401 Physical and Analytical Chemistry</p>	<ol style="list-style-type: none"> 1. Define the terms in phase equilibria such as- system, phase in system, components in system, degree of freedom, one / two component system, phase rule, etc. 2 Explain meaning and Types of equilibrium such as true or static, metastable and unstable equilibrium. 3 Discuss meaning of phase, component and degree of freedom. 4 Derive of phase rule. 5 Explain of one component system with respect to: Description of the curve, Phase rule relationship and typical features for i) Water system ii) Carbon dioxide system iii) Sulphur system 6 Define various terms, laws, differentiate ideal and no-ideal solutions. 7 Discuss / explain thermodynamic aspects of Ideal solutions-Gibbs free energy change, Volume change, Enthalpy change and entropy change of mixing of Ideal solution. 8 Differentiate between ideal and non-ideal solutions and can apply Raoult's law. 9 Interpretation of i) vapour pressure–composition diagram ii) temperature-composition diagram. 10 Explain distillation of liquid solutions from temperature – composition

	<p>diagram.</p> <p>11 Explain / discuss azeotropes, Lever rule, Henry's law and its application.</p> <p>12 Discuss / explain solubility of partially miscible liquids- systems with upper critical. Solution temperature, lower critical solution temperature and having both UCST and LCST.</p> <p>13 Explain / discuss concept of distribution of solute amongst pair of immiscible solvents.</p> <p>14 Derive distribution law and its thermodynamic proof.</p> <p>15 Apply solvent extraction to separate the components of from mixture interest.</p> <p>16 Solve problem by applying theory.</p> <p>17 Explain / define different terms in conductometry such as electrolytic conductance, resistance, conductance, Ohm's law, cell constant, specific and equivalent conductance, molar conductance, Kohlrausch's law, etc.</p> <p>18 Discuss / explain Kohlrausch's law and its Applications, Conductivity Cell, Conductivity Meter, Whetstone Bridge.</p> <p>19 Explain / discuss conductometric titrations.</p> <p>20 Apply conductometric methods of analysis to real problem in analytical laboratory.</p> <p>21 Solve problems based on theory / equations.</p> <p>22 Correlate different terms with each other and derive equations for their correlations.</p> <p>23 Explain / define different terms in Colorimetry such as radiant power, transmittance, absorbance, molar, Lambert's Law, Beer's Law, molar absorptivity</p> <p>24 Discuss / explain / derive Beer's law of absorptivity.</p> <p>25 Explain construction and working of colorimeter.</p> <p>26 Apply colorimetric methods of analysis to real problem in analytical laboratory.</p> <p>27 Solve problems based on theory / equations.</p> <p>28 Correlate different terms with each other and derive equations for their correlations.</p> <p>29 Explain / define different terms in column chromatography such as stationary phase, mobile phase, elution, adsorption, ion exchange resin, adsorbate, etc.</p>
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<p>CH-402 Inorganic and Organic Chemistry</p> <p>CH-403 Practical</p>	<p>30 Explain properties of adsorbents, ion exchange resins, etc.</p> <p>31 Discuss / explain separation of ionic substances using resins.</p> <p>32 Discuss / explain separation of substances using silica gel / alumina.</p> <p>33 Apply column chromatographic process for real analysis in analytical laboratory.</p> <p>1. Isomerism in coordination complexes</p> <p>2. Explain different types of isomerism in coordination complexes.</p> <p>3. Apply principles of VBT to explain bonding in coordination compound of different geometries.</p> <p>4. Correlate no of unpaired electrons and orbitals used for bonding.</p> <p>5. Identify / explain / discuss inner and outer orbital complexes.</p> <p>6. Explain / discuss limitation of VBT.</p> <p>7. Explain principle of CFT.</p> <p>8. Apply crystal field theory to different type of complexes (Td, Oh, Sq, Pl complexes)</p> <p>9. Explain: i) strong field and weak field ligand approach in Oh complexes ii) Magnetic properties of coordination compounds on the basis of weak and strong ligand field ligand concept. iii) Origin of colour of coordination complex.</p> <p>10. Calculate field stabilization energy and magnetic moment for various complexes.</p> <p>11. To identify Td and Sq. Pl complexes on the basis of magnetic properties / unpaired electrons.</p> <p>12. Explain spectrochemical series, tetragonal distortion / Jahn-Teller effect in Cu(II) Oh complexes only.</p> <p>13. Identify and draw the structures aldehydes and ketones from their names or from structure name can be assigned.</p> <p>14. Explain / discuss synthesis of aldehydes and ketones.</p> <p>15. Write / discuss the mechanism reactions aldehydes and ketones.</p> <p>16. Explain /Discuss important reactions of aldehydes and ketones.</p> <p>17. To correlate reagent and reactions of aldehydes and ketones</p> <p>18. Give synthesis of expected aldehydes and ketones.</p> <p>19. Perform inter conversion of functional groups.</p> <p>20. Identify and draw the structures carboxylic acids and their derivatives from their names or from structure name can be assigned.</p> <p>21. Explain / discuss synthesis of carboxylic acids and their derivatives.</p> <p>22. Write / discuss the mechanism reactions carboxylic acids and their derivatives.</p> <p>23. Explain /Discuss important reactions of carboxylic acids and their derivatives.</p> <p>24. Correlate reagent and reactions of carboxylic acids and their derivatives</p> <p>25. Give synthesis of expected carboxylic acids and their derivatives.</p>
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Chemistry	<p>26. Perform inter conversion of functional groups.</p> <p>27. Identify and draw the structures amines from their names or from structure name can be assigned.</p> <p>28. Explain / discuss synthesis of carboxylic amines.</p> <p>29. Write / discuss the mechanism reactions carboxylic amines.</p> <p>30. Explain /Discuss important reactions of carboxylic amines.</p> <p>31. To correlate reagent and reactions of carboxylic amines.</p> <p>32. Give synthesis diazonium salt from amines and reactions of diazonium salt.</p> <p>33. Perform inter conversion of functional groups.</p> <p>34. Draw the structures of different conformations of cyclohexane.</p> <p>35 Define terms such as axial hydrogen, equatorial hydrogen, confirmation, substituted cyclohexane, etc.</p> <p>36. Convert one conformation of cyclohexane to another conformation and should able to identify governing structural changes.</p> <p>37. Explain / discuss stability with respect to potential energy of different conformations of cyclohexane.</p> <p>38. Draw structures of different conformations of methyl / t-butyl monosubstituted cyclohexane (axial, equatorial) and 1, 2 dimethyl cyclohexane.</p> <p>39. Identify cis- and trans-isomers of 1, 2 dimethyl substituted cyclohexane and able to compare their stability.</p> <p>1. Verify theoretical principles experimentally</p> <p>2. Interpret the experimental data on the basis of theoretical principles.</p> <p>3. Correlate the theory to the experiments. Understand / verify theoretical principles by experiment or explain practical output with the help of theory.</p> <p>4. Understand systematic methods of identification of substance by chemical methods.</p> <p>5. Write balanced equation for all the chemical reactions performed in the laboratory.</p> <p>6. Perform organic and inorganic synthesis and able to follow the progress of the chemical reaction.</p> <p>7. Set up the apparatus properly for the designed experiments.</p> <p>8. Perform the quantitative chemical analysis of substances and able to explain principles behind it.</p>
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TY BSc - text for each subject

Physical Chemistry	<ul style="list-style-type: none"> • Understand the role of computers in simulating chemical processes analyzing data. • Quantify the ideas (not overshadowed by mathematics) about the behavior of molecules and systems in order to be able to cope with experimental testing. • Distinguish the usefulness of mathematics in Physical Chemistry and to be inspired by the charm of their application. • Thinks and reflects in the language of science avoiding the simple
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	memorization of knowledge.
Inorganic Chemistry	<ul style="list-style-type: none"> • Student can draw molecular orbital diagram, • Learn about basic concept of coordination chemistry, BMO, ABMO orbitals splitting of d orbitals , • Know about crystalline structure, • Know about homogeneous and heterogeneous catalysis
Organic Chemistry	<ul style="list-style-type: none"> • Describe the synthesis of chemical reactions of polynuclear and hetroonuclear aromatic Hydrocarbons. • Meaning of active methylene group • Reactivity of methylene group, • Synthetic applications ethyl acetoacetate and malonic ester • To predict product with panning or supply the reagent/s for these reactions • From the IR spectrum, they will be able to find out IR frequencies of different functional groups. And thus, they will be able to find functional groups present in the compound. • Students will understand the principle of NMR spectroscopy and will understand various terms used in NMR spectroscopy. They will learn measurement of chemical shift and coupling constants.
Analytical Chemistry	<ul style="list-style-type: none"> • Upon completion of a degree • acquire the Principles of Qualitative and Quantitative analysis w.r.t. Gravimetric , Thermal and Electrogravimetric analysis in detail. • Principles of Quantitative Analysis (Spectrophotometry - Colorimeter, spectrophotometer, AAS, FES and Polarography) with instrumentation, role of each part, types of instruments and its applications. • Principles of separation Techniques like solvent extraction
Industrial Chemistry	<ul style="list-style-type: none"> • Understanding of industrial processes and various chemical manufacturing processes of food , cement ,starch • ,glass , polymer, sugar and fermentation, soap, detergents and cosmetics, dyes and paints, pharmaceutical industries. • Importance of chemical industry, Various insecticides, Various insecticides, • Composition of petroleum, resources, processing of petroleum Fuels and eco-friendly fuels
Environmental Chemistry	<ul style="list-style-type: none"> • Principles of green chemistry, Advantages of green chemistry, Methods of water purification, Waste water treatment process, Techniques used to monitor hazardous materials present in environment

MSc I - text for each subject

Name of the	Course Outcome
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Subject	
<p>CCTP-1: CHP-110 Physical Chemistry</p> <p>CCTP-1: CHP-210 Physical Chemistry</p>	<ol style="list-style-type: none"> 1. Understand the role of computers in simulating chemical processes and analyzing data. 2. Quantify the ideas (not overshadowed by mathematics) about the behavior of molecules and systems in order to be able to cope with experimental testing. 3. Distinguish the usefulness of mathematics in Physical Chemistry and to be inspired by the charm of their application. 4. Thinks and reflects in the language of science avoiding the simple memorization of knowledge <ol style="list-style-type: none"> 1. To determine types of molecule on the basis of moment of inertia and rotational spectra. 2. To determine the vibrations of polyatomic molecule. 3. To determine quantum and classical theory of Raman effect, pure rotational Raman spectra 4. To determine electronic spectra of diatomic molecules 5. To determine Principle, Instrumentation and Applications of Mossbauer Spectroscopy.
<p>CCTP-2: CHI-130, Inorganic Chemistry-I</p>	<ol style="list-style-type: none"> 1. Student should visualize/ imagine molecules in 3 dimensions. 2. To understand the concept of symmetry and able to pass various symmetry elements through the molecule. 3. Understand the concept and point group and apply it to molecules. 4. To understand product of symmetry operations. 5. To apply the concept of point group for determining optical activity and dipole moment 6. Student should understand the importance of Orthogonality Theorem. 7. They should able to learn the rules for constructing character table. 8. Using reduction formulae should be able to find out the possible type of hybridization. 9. Student should know the concept of SALC. 10. Student able to find out character for reducible representation. 11. To know about projection operator. 12. Apply projection operator to find out the normalized wave function for atomic orbital. 13. Student should correlate the application of symmetry to spectroscopy. 14. Students able to find out the possible modes of vibration. 15. From the previous knowledge of symmetry student must able to find out which mode are IR active. <p>1. Student should understand the detail chemistry of S and P block elements</p>

	<p>w.r.t. their compounds, their reactions and applications.</p> <p>2. To learn the advance chemistry of boranes, fullerene, zeolites, polymers etc.</p> <p>3. Organometallic chemistry of some important elements from the main groups and their applications</p>
<p>CCTP-5: CHI-230, Inorganic Chemistry, Semester – II</p>	<ol style="list-style-type: none"> 1. Student should able to find out the no of microstates and meaningful term symbols, construction of microstate table for various configuration 2. Hund's rules for arranging the terms according to energy. 3. Student should understand interelectronic repulsion. 4. Student should know the concept of weak and strong ligand field. 5. Student able to find out splitting of the free ion terms in weak ligand field and strong ligand field. 6. To draw correlations diagram for various configurations in Td and Oh ligand field. 7. Student should know basic instrumentation and selection rules and relaxation in rules. 8. Student should know basic d-d transition, d-p mixing, charge transfer spectra. 9. Interpretation of electronic spectra for spin allowed oh and td complexes using Orgel diagram. 10. Understand the concept of spectro chemical series and Nephelauxetic series. 11. Should able to solve numerical based on crystal field parameters. 12. Understand the various terms involved in magnetochemistry. 13. Various phenomenons of magnetism and their temperature dependence. 14. Various experimental methods to find out magnetic moment. 15. Understand the various Quenching of orbital angular momentum 16. Importance of bioinorganic chemistry. 17. Role of metals in Metalloprotein and metalloenzymes. 18. Similarities in coordination theory for metal complexes and metal ions complexed with biological ligands. 19. Importance and transport of metal ions. 20. Passive transport metal ions by ionophores and gramicidin. 21. Mechanism for active transport of Na⁺ and K⁺ 22. Nerve impulse generation in rod cell of retina. 23. Importance and function of Ca, Fe and Mg in metalloprotein 24. Catalytic role of Mn in photosynthesis.
<p>CCTP-3: CHO-150, Organic Chemistry-I, Semester – I</p>	<ol style="list-style-type: none"> 1. They will understand the criteria for aromaticity in nonbenzenoid molecules and other advanced polycyclic aromatics 2. Understand the chemistry of monocyclic heterocycles, nomenclature and reactions 3. Learn the concept stereochemistry and its importance; their rules and the

- concept of chirality
4. Understand the role of various reaction intermediates like carbocation, carbanion, carbenes, radicals, and nitrenes in organic reactions; concept of NGP
 5. Able to describe mechanism of different rearrangement reactions. Appreciates the various steps involved in the molecular rearrangements.
 6. Understand the chemistry of Ylides
 7. Use synthetic reagent of oxidation and reduction for solving the problems
 8. To understand some fundamental aspects of organic chemistry, to learn the concept aromaticity, to understand the various types of aromaticity
 9. To study heterocyclic compound containing one and two hetero atoms with their structure, synthesis and reactions.
 10. To know stereochemistry of organic compounds; able to do interconversion of Fischer to Newmann, Newmann to Sawhorse and vice versa, Able to assign R and S to given molecules; understand stereoselective and stereospecific reactions; acquire knowledge on topicity.
 11. To study structure, formation, stability and related name reaction of intermediates like Carbocation, Carbanion, Free Radical, Carbenes and nitrenes; Recognize neighboring group participation
 12. To study rearrangement reaction with specific mechanism and migratory aptitude of different groups.
 13. To study Ylides and their reaction.
 14. To understands the basis of redox reaction; acquire knowledge about the reagents which causes selective oxidation / reduction in various compounds; learn the basic mechanism of oxidation / reduction in organic compounds.
1. Students should able to understand free radicals' formation, stability and reactivity and should also be able to use the basic understanding in writing probable reaction mechanisms.
 2. Students should able to write MO diagram for various olefinic compounds and should able to predict the products, the stereochemistry as well as should able to understand the preferred reaction pathways.
 3. Students should able to calculate max of organic compounds containing more than one and less than four conjugated systems. Students should able to correlate IR bands with functional groups using numerical data as well as spectral data.
 4. Students should able to solve $^1\text{H-NMR}$ problems and should also able to draw the $^1\text{H-NMR}$ spectrum for simple organic compounds mentioning multiplicity pattern and coupling constant with the help of "Tree Diagram" Should able to predict and analyze the multiplicity patterns with more than one coupling constants.
 5. Students should able to use $^{13}\text{C-NMR}$ data to interpret the structure NMR problems and should also able to draw the $^1\text{H-NMR}$ spectrum for simple organic compounds mentioning multiplicity pattern and coupling constant with the help of "Tree Diagram" Should be able to predict and analyze the multiplicity patterns with more than one coupling constants.
 6. Students should know various key factors responsible for the

<p>Semester-II</p>	<p>spectroscopic data acquisition and should able to solve Problems based on UV, IR, MS, ¹H-NMR, ¹³C-NMR.</p> <p>Students will be able to understand -</p> <ol style="list-style-type: none"> 1. MOT and will be able to extend this in predicting reaction mechanism and stereochemistry of electrocyclic reactions. 2. The concepts in free radical reactions, mechanism and the stereochemical outcomes. 3. The basic principle of spectroscopic methods and their applications in structure elucidation of organic compounds using given spectroscopic data or spectra.
<p>CBOP-1: CHG – 190, General Chemistry-I</p> <p>SECTION-I: Theory Course</p> <p>Elective Option-C: Introduction to Chemical Biology-I</p>	<p>The goal of this course is to introduce students to fundamental concepts in Chemical Biology and methods of chemistry used to solve problems in molecular and cell biology. After completion of this course, successful students will:</p> <ol style="list-style-type: none"> 1) Students will be able to explore new areas of research in both chemistry and allied fields of science and technology. 2) Students will be able to function as a member of an interdisciplinary problem solving team. 3) To impart the students thorough idea in the chemistry of carbohydrates, amino acids, proteins and nucleic acids etc. 4) Be able to describe the chemical basis for replication, transcription, translation and how each of these central processes can be expanded to include new chemical matter. 5) Develop skills to critically read the literature and effectively
<p>SECTION-II: Practical Course</p> <p>Elective Option-A: Inorganic Material Analysis, Synthesis and Applications</p>	<ol style="list-style-type: none"> 1. Determination of Silica and Manganese from pyrolusite ore 2. Determination of copper and iron from Chalcopyrite ore. 3. Synthesis of solid state materials / nano-materials. 4. Removal and kinetics of photocatalytic dyes, degradation. 5. Determination of tin and lead from solder alloy 6. Determination of iron and chromium from stainless steel alloy.
<p>CBOP-2: CHG – 290, General Chemistry -II,</p> <p>SECTION-I: Theory Course</p> <p>Elective Option-C: Introduction</p>	<p>The goal of this course is to introduce students to fundamental concepts in Chemical Biology and methods of chemistry used to solve problems in molecular and cell biology. After completion of this course, successful students will:</p> <ol style="list-style-type: none"> 1) Students will be able to explore new areas of research in both chemistry and allied fields of science and technology. 2) Students will be able to function as a member of an interdisciplinary problem solving team. 3) To impart the students thorough idea in the chemistry of carbohydrates,

<p>to Chemical Biology-II</p>	<p>amino acids, proteins and nucleic acids etc. 4) Be able to describe the chemical basis for replication, transcription, translation and how each of these central processes can be expanded to include new chemical matter. 5) Develop skills to critically read the literature and effectively communicate research in a peer setting. 6) Describe the importance of chemical biology research and interdisciplinary work.</p>
<p>SECTION-II: Practical Course</p>	<ol style="list-style-type: none"> 1. Hydrolysis of NH_4Cl or CH_3COONa or aniline hydrochloride 2. Hydrolysis of ethyl acetate by NaOH. 3. Stability Constant of a complex ion. 4. Estimation of halide in mixture 5. Determination of the acid and base dissociation constant of an amino acid and hence the isoelectric point of the acid. 5. Determination of dissociation constants of tribasic acid. 6. Detailed interpretation of Raman spectra of diatomic molecules.
<p>Elective Option-A: Electrochemical Methods of Analysis:</p>	<ol style="list-style-type: none"> 1. Statistical treatment of experimental data. 2. Determination of an order of a reaction. 3. Kinetics of oxidation of ethanol. 4. Determination of molecular weight by steam distillation 5. Determination of the densities of a series of solutions and to calculate the molar volumes of the components. 6. Thin Layer Chromatography technique 7. Column Chromatography technique. 8. Meaning of safety signs on container of chemicals, safety handling of chemicals. 9. Purification of organic solids by recrystallization using solvents other than water. 10. Purification of organic liquids by upward/downward/traditional distillation technique.
<p>CCPP-1: CHP-107: Practical Course – I: Semester –I</p>	

CCPP-2: CHP-227: Practical Course-II: Semester -II	<ol style="list-style-type: none"> 1. This course is designed to make students aware of how to perform organic compounds in laboratory. 2. The course includes synthesis of some derivatives and organic compounds, which will help them while working in research laboratory in future. 3. Making derivatives of organic compounds will help them in industry or while doing research in medicinal chemistry for Drug development. 4. This practical course is also designed to make student aware of green chemistry and role of green chemistry in pollution reduction. 5. The students learn how to avoid solvents and do solvent free reaction. 6. Also the work-up procedure in many experiments is made more eco-friendly to environment. 7. Students are trained to different purification techniques in organic chemistry like recrystallization, distillation, steam distillation and extraction. 8. Students are made aware of safety techniques and handling of chemicals 9. Students are made aware of carrying out different types of reactions and their workup methods. 10. This practical course is designed to make student aware of green chemistry and role of green chemistry in pollution reduction.

MSc II - text for each subject

Name of the Subject	Course Outcome
Organic Reaction Mechanism and Biogenesis(CHO-350)	<ol style="list-style-type: none"> 1. Understand the Mechanism of the reaction and application of the reaction. 2. To determine Kinetic and Non- Kinetic methods. 3. To determine Free Radicals in Organic Synthesis. 4. To determine Hammett Equation, Substituent constants, Use of Hammett plots. 5. To determine Synthesis of Biogenesis of Terpenoids. 6. To determine case study of alkaloids from isolated roots of <i>Piper nigrum</i>.

<p>Structure Determination of Organic Compounds by Spectroscopic Compounds. (CHO-351)</p>	<ol style="list-style-type: none"> 1. To determine first and second order splitting. 2. To determine chiral NMR solvents in structure determination. 3. To determine fundamentals and applications in structure elucidation. 4. 2D NMR spectroscopy in structure elucidation. 5. To determine complex multiplicity patterns and coupling constants in asymmetric compounds.
<p>Organic stereo Chemistry (CHO-352)</p>	<ol style="list-style-type: none"> 1. Logical reasoning as well as thinking should be enhanced in students 2. Students should be able to find out reaction products of organic reactions with proper stereo chemistry. 3. Students should be able to understand the proper stereochemistry of cyclic compounds.
<p>CBOP-3, Designing Organic Synthesis and Heterocyclic chemistry reaction(CHO-353(B)</p> <p>CCPP- 3 CHO-354 : Practical -1 Solvent Free Organic Synthesis</p> <p>CCTP-10, Chemistry of Natural Products reaction(CHO-450)</p>	<ol style="list-style-type: none"> 1. To determine retrosynthetic analysis. 2. To determine interconversion of two groups. 3. To determine C-C disconnection in heteroatom and heterocyclic compounds. <ol style="list-style-type: none"> 1. To determine solvent free Carbon-Carbon bond formation. 2. To determine solvent free C-N bond formation. 3. To determine solvent free C-S bond formation 4. To determine solvent free C-X bond formation 5. To determine solvent free N-N bond formation <ol style="list-style-type: none"> 1. Understanding and planning of total synthesis while maintaining the stereochemistry. 2. To determine total synthesis of given molecules.

<p>CBOP-4 , Concepts and Applications of Medicinal Chemistry(CHO- 452 -A)</p> <p>CBOP-5 , Practical –III Chemistry(CHO- 453)</p> <p>CCPP-04, Practical –II Chemistry(CHO- 454)</p>	<ol style="list-style-type: none"> 1. To determine proteins as biological catalysts. 2. To determine chemistry of diseases and drug development. 3. To determine Pharmacokinetics and Pharmacodynamics of drug. <ol style="list-style-type: none"> 1. Ternary Mixture Separation. 2. Carbohydrates synthesis and isolation of Natural Products. <ol style="list-style-type: none"> 1. Convergent Synthesis 2. Divergent Synthesis.
<p><u>Zoology</u></p>	
<p>F.Y.B.Sc. and S.Y.B.Sc. Paper I</p>	<ul style="list-style-type: none"> ❖ This course will provide students with an opportunity to gain information regarding animal classification and systematic, animal structure and function relationships, evolution between and within major animal groups, animal reproduction and development, animal diversity and animal ecology. ❖ The General Zoology course is designed to introduce students to the study of zoology at the organismal and organ function levels. ❖ The general zoology course provides the student with an introduction to the recent advances in zoology in the areas of systematic, evolution, reproduction, development. ❖ At the end of the semester, the students are expected to have: ❖ Understand the interrelationship of all life forms through the knowledge of common life processes; ❖ Recognize the diversity of animal life and the role played by each animal in its environment; ❖ Appreciate the Maker for placing every living thing in its proper order and for the balance of nature.

<p>F.Y.B.Sc. and S.Y.B.Sc. Paper II</p>	<ul style="list-style-type: none"> ❖ Applied zoology, cell biology and Genetics courses provide offer a broad, relevant and contemporary curriculum. ❖ The lecture section of the course will review the general principles of modern and applied zoological theory. ❖ The courses encourage in students an enthusiasm for biological sciences in general for whole animal science and conservation of the natural environment in particular. ❖ It develops an understanding of the ethical, economic, legal and political context of keeping captive animals, animal behavior, ecology and conservation. ❖ It produces graduates with the ability to apply concepts from Zoology and communicate ideas effectively in a range of contexts and communication modes. ❖ It produces graduates with genuine flexibility in career choice and broadly applicable skills. ❖ It produces graduates with the ability to become autonomous learners equipped cope with higher degree studies. ❖ The courses meet the need for an accessible part-time progression to an graduate degree for suitably qualified students’.
<p>F.Y.B.Sc. and S.Y.B.Sc. Paper III</p>	<ul style="list-style-type: none"> ❖ The practical courses provide opportunities for practical work practical skills in laboratory-based and field zoology and experiential learning in aspects of Applied Zoology. ❖ The specific learning goals for General Zoology are to provide students with a working knowledge of fundamental principles in zoology that will provide a foundation for their later advanced course work in more specific biological subjects. ❖ As General Zoology is a basic course, students will become familiar with animal classification schemes and associated taxonomic group diagnostic characteristics as well as developing an understanding of and ability to apply basic zoological

	<p>principles.</p> <ul style="list-style-type: none"> ❖ The laboratory and lecture sections of the course are highly integrated and directed toward teaching students the principles of animal evolution, classification, form and function. ❖ It promotes students' ability to critically think about, assess and evaluate data gathered both in the field and through scientific literature.
<u>BOTANY</u>	
FIRST YEAR	
Course : Plant life and utilization I (BO111)	<p>CO1 Students understand the diversity of lower plant and their distinct features.</p> <p>CO2 Understand the algal diversity and its industrial application</p> <p>CO3 knows about distinct classes of Lichen and their utilization</p> <p>CO4 Understand the Fungal diversity and their application in various industries. Also know how to Cultivate the mushroom and their values.</p> <p>CO5 Knows about character, classification and utilization of bryophyte at industrial level</p>
Course: Plant morphology and Anatomy (BO112)	<p>CO1 Understand the importance of plant morphology in allied branches of botany</p> <p>CO2 Students get an idea about various floral whorl and its importance in plant reproduction</p> <p>CO3 Students study the role of anatomy in other allied branches of botany</p> <p>CO4 Student know about the different tissues present in plant their structure and role.</p> <p>CO5 understand the differences in internal organization of two distinct plant group and plant parts</p>
Course: Plant life and utilization II (BO121)	<p>CO1 Students understand the differences in higher plant structure</p> <p>CO2 Knows the different characters in Pteridophytes and their uses</p> <p>CO3 Know the distinct features of gymnosperm, structure of Cycas and their economic potential</p> <p>CO4 Understand the morphological differences in dicot and monocot</p>

	<p>and their classification</p> <p>CO5 Knows the value of angiosperm in various industries such as food, fodder and fiber</p>
<p>Course: Principles of Plant Science (BO122)</p>	<p>CO1 Understanding the scope and importance of plant physiology.</p> <p>CO2 Demonstrate processes imbibition, Osmosis, Diffusion and Plasmolysis</p> <p>CO3 Describe Plant growth regulators and their types.</p> <p>CO4 Discuss the structure of plant cell and Plasma membrane and cell cycle in plants</p> <p>CO5 Explain the scope and importance of molecular biology.</p> <p>CO6 Describe the structure of DNA, Packing of DNA and types of DNA, RNA.</p> <p>CO7 Explain the DNA replication process, enzymes involved in that process.</p>
<p>SEM I Course Paper I: Taxonomy of Angiosperm and Plant Community (BO – 211)</p>	<p>CO1 Students will learn the application of morphology in plant identification, classification and nomenclature</p> <p>CO2 Students learn Plant collection, preservation techniques and can identify plant in field.</p> <p>CO3 Students get aware about various recent computerized tools used in plant research</p> <p>CO4 Students will know how the vegetation pattern change in different ecosystem</p> <p>CO5 Students will learn the techniques of vegetation studies and its application</p>
<p>Course Paper II Plant Physiology</p>	<p>CO1 Define the terminologies: Plant water relations, Growth, Transpiration, Ascent of Sap, Plant growth regulators and Nitrogen metabolism.</p> <p>CO2: Explain processes of mineral nutrition, absorption of water, ascent of sap, mechanisms of water loss from plants.</p>

	<p>CO3: Demonstrate processes imbibition, Osmosis, Diffusion and Plasmolysis, measure growth by arc auxanometer, Bose Cresco graph.</p> <p>CO4: Describe Plant growth regulators and their types and Discuss nitrogen metabolism in plants</p> <p>CO5: Explain mechanisms and application of photoperiodism, vernalisation and classify the plants based on Photoperiodism.</p>
<p>SEM II</p> <p>Course Paper I:</p> <p>Plant Anatomy, Embryology and Palynology (BO 213)</p>	<p>CO1 Define terms related to plant Anatomy, Embryology.</p> <p>CO2 Describe various tissue systems in plants like epidermal, mechanical and vascular.</p> <p>CO3 Interpret the Principles involved in distribution of mechanical tissues.</p> <p>CO4 Explain the process of normal and abnormal secondary growth in plants.</p> <p>CO5 Differentiate between normal and abnormal secondary growth.</p> <p>CO6 Identify the process of pollination and fertilization.</p> <p>CO7 Discuss the Structure and development process of male and female gametophyte</p> <p>CO8 Illustrate the types of microspore, ovules, embryo, seed and endosperm.</p>
<p>Course Paper II:</p> <p>Plant Biotechnology (BO 213)</p>	<p>CO1 Define the terminologies related to plant biotechnology.</p> <p>CO2 Describe the fermentation process.</p> <p>CO3 Explain enzyme technology and their industrial scale production.</p> <p>CO4 Interpret the production of Single cell proteins.</p> <p>CO5 Illustrate the concept of phytoremediation.</p> <p>CO6 Describe General method of gene isolation from the plants and their application.</p> <p>CO7 Explain Methods of gene, transfer in plants.</p> <p>CO8 Illustrate Application of plant genetic engineering and Nano-biotechnology in crop improvement</p>
	PHYSICS
	FIRSTYEAR

TERM I- Mechanics	<ol style="list-style-type: none"> 1. Demonstrate an understanding of Newton's laws and applying them in calculations of the motion of simple systems. 2. Use the free body diagrams to analyze the forces on the object. 3. Understand the concepts of energy, work, power, the concepts of conservation of energy and be able to perform calculations using them. 4. Understand the concepts of elasticity and be able to perform calculations using them. 5. Understand the concepts of surface tension and viscosity and be able to perform calculations using them. 6. Use of Bernoulli's theorem in real life problems. 7.
Physics Principles and applications	<ol style="list-style-type: none"> 1. To demonstrate an understanding of electromagnetic waves and its spectrum. 2. Understand the types and sources of electromagnetic waves and applications. 3. To understand the general structure of atom, spectrum of hydrogen atom. 4. To understand the atomic excitation and LASER principles. 4. To understand the bonding mechanism in molecules and rotational and vibrational energy levels of diatomic molecules.
Heat and Thermodynamics	<ol style="list-style-type: none"> 1 Describe the properties of and relationships between the thermodynamic properties of a pure substance. 2 Describe the ideal gas equation and its limitations. 3 Describe the real gas equation. 4 Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process. 5 Analyze the heat engines and calculate thermal efficiency. 6 Analyze the refrigerators, heat pumps and calculate coefficient of performance. 7 Understand property „entropy“ and derive some thermodynamical relations using entropy concept. 8 Understand the types of thermometers and their usage.
Electromagnetism	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the electric force, field and potential, and related concepts, for stationary charges. 2. Calculate electrostatic field and potential of simple charge distributions using Coulomb's law and Gauss's law. 3. Demonstrate an understanding of the dielectric and effect on dielectric due to electric field. 4. Demonstrate an understanding of the magnetic field for steady currents using Biot-Savart and Ampere's laws. 5. Demonstrate an understanding of magnetization of materials.
F Y B Sc Physics Practical	<ol style="list-style-type: none"> 1. Acquire technical and manipulative skills in using laboratory equipment, tools, and materials.

	<ol style="list-style-type: none"> 2. Demonstrate an ability to collect data through observation and/or experimentation and interpreting data. 3. Demonstrate an understanding of laboratory procedures including safety, and scientific methods. 4. Demonstrate a deeper understanding of abstract concepts and theories gained by experiencing and visualizing them as authentic phenomena. <p>Acquire the complementary skills of collaborative learning and teamwork in laboratory settings</p>
SECOND YEAR	
Mathematical Methods in Physics	<ol style="list-style-type: none"> 1. Understand the complex algebra useful in physics courses 2. Understand the concept of partial differentiation. 3. Understand the role of partial differential equations in physics 4. Understand vector algebra useful in mathematics and physics Understand the singular points of differential equation.
Electronics	<ol style="list-style-type: none"> 1. Apply laws of electrical circuits to different circuits. 2. Understand the relations in electricity 3. Understand the properties and working of transistors. 4. Understand the functions of operational amplifiers. 5. Design circuits using transistors and operational amplifiers. 6. Understand the Boolean algebra and logic circuits.
Oscillation, waves and sound	<ol style="list-style-type: none"> 1. Understand the physics and mathematics of oscillations. 2. Solve the equations of motion for simple harmonic, damped, and forced oscillators. 3. Formulate these equations and understand their physical content in a variety of applications, 4. Describe oscillatory motion with graphs and equations, and use these descriptions to solve problems of oscillatory motion. 5. Explain oscillation in terms of energy exchange, giving various examples. 6. Solve problems relating to Undamped, damped and force oscillators and superposition of oscillations 7. Understand the mathematical description of travelling and standing waves. 8. Calculate the phase velocity of a travelling wave. 9. Explain the Doppler Effect, and predict in qualitative terms the frequency change that will occur for a stationary and a moving observer.
Optics	<ol style="list-style-type: none"> 1. Acquire the basic concepts of wave optics 2. describe how light can constructively and destructively interfere 3. explain why a light beam spreads out after passing through an aperture 4. summarize the polarization characteristics of electromagnetic waves 5. appreciate the operation of many modern optical devices that

	<p>utilize waveoptics</p> <p>6. Understand optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model.</p>
<p>S Y B Sc. Physics Practical</p>	<ol style="list-style-type: none"> 1. After completing this practical course students will be able to 2. Use various instruments and equipment. 3. Design experiments to test a hypothesis and/or determine the value of an unknown quantity. 4. Investigate the theoretical background to an experiment. 5. Set up experimental equipment to implement an experimental approach. 6. Analyze data, plot appropriate graphs and reach conclusions from your data analysis. 7. Work in a group to plan, implement and report on a project/experiment.