Lions Club of Silvassa Charitable Trust's

Smt. Devkiba Mohansinhji Chauhan College of Commerce & Science

(Affiliated to University of Mumbai)

3 Years B.Com. and B.M.S. Program Objectives

1. Domain knowledge: Demonstrate sound domain knowledge and competence in the discipline with a proficiency in research and related skills along with a passion for lifelong learning.

2. Critical thinking: Demonstrate critical thinking, analytical and interpretative ability: to evaluate and critique texts and discourses.

3. ResSearch skills: Identify, select, organise and use research techniques to carry out research and value intellectual property rights.

4. Professional skills: Excel professionally in a globally competitive world in academia, industry, government and entrepreneurial pursuits as creative individuals with leadership qualities and ability to work in teams with effective communication skills and intercultural competence.

5. Social Sensitivity: Develop as socially and ethically responsible citizens who are aware and sensitive to local needs and contribute to society.

6. Use of modern tools: Choose and use basic computer applications and domain-specific digital tools and social media.

7. Interdisciplinary bandwidth: Understand, investigate and evaluate concepts from diverse disciplines.

8. Awareness for environment and society: Serve and assist in socially/ environmentally useful and productive work.

9. Respect for otherness: Demonstrate awareness and show sensitivity for the underprivileged, the differently abled and the discriminated, and understand gender diversity, differences and display conflict management skills.

10. Ethics: Discuss and assess values of human dignity, empathy, integrity, moral courage, social justice and inclusivity.

11. Lifelong learning: Cultivate self-awareness, inner strength, creative and original thinking and attitude to continuously update and upgrade one's knowledge and expertise.

12. Job Skills: Develop soft skills and technical skills related to opportunities in industry, academia and research.

13. Global Cross-Cultural Understanding: Develop capacity to thrive in a globalised society, economy and cultures, and develop the ability to respect diverse cultural perspectives and apply knowledge in a culturally appropriate manner.

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B.Com. and B.M.S. Course Outcome

Paper No:	Paper Name
Paper 1	**Accountancy and Financial Management**
CO1:	• understand the theoretical framework of accounting and to prepare financial statements
CO2:	• explain the nature and scope of financial management as well as time value of money and risk return trade off
CO3:	• analyze capital budgeting process and capital budgeting techniques
CO4:	• estimate various capital structure theories and factors affecting capital structure decisions in a firm
CO5:	• critically examine various theories of dividend and factors affecting dividend policy
CO6:	• evaluate working capital requirement
Paper 2:	**Business Economics**
CO1:	• gain the skills needed to understand complex markets but come away with strong analytical and problem-solving skills
CO2:	• Learn the business acumen necessary to succeed in the professional world.
CO3:	• Apply the knowledge of national income accounting and cost of living measurement in real world situations.
Paper 3:	**Business Communication**
CO1:	• To know the basics of marketing communication and the processes.
CO2:	• acquire skills to create and make good presentations
CO3:	• analyze decision making and communication.
CO4:	• To understanding nuances of communication.
Paper 4:	**Environmental Studies**
Paper 5:	**Foundation Course**
Paper 6:	**Mathematical and Statistical Techniques**
CO1:	• acquire a fair degree of proficiency in comprehending statistical data, processing and analyzing it using descriptive statistical tools.
CO2:	• understand the relationship between two variables using concepts of correlation and regression and its use in identifying and predicting the variables.
CO3:	• comprehend the concept of systematic processing and interpreting the information in quantitative terms to arrive at an optimum solution to business problems.
CO4:	• develop proficiency in using different mathematical tools (matrices, calculus, linear programming, and mathematics of finance) in solving daily life problems.
CO5:	• obtain critical thinking and problem-solving aptitude.

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Paper 7:	**Commerce**
Paper 8:	**Management Accounting**
CO1:	• understand thoroughly the conceptual framework of Management Accounting; identification of differences between different forms of accounting—Financial, Cost and Managerial; distinction between cost control and cost reduction.
CO2:	• understand the concept of marginal cost and marginal costing; preparation of income statements using absorption and variable costing; learning of cost-volume-profit analysis and break-even analysis using mathematical and graphical approaches; and the application in businesses.
CO3:	• understand the concept of relevant and irrelevant costs and make decisions related to different business situations using marginal costing and differential costing techniques.
CO4:	• understand budgetary control system as a tool of managerial planning and control; ability to prepare various types of budget. Ability to understand standard costing system as a tool of managerial control; calculation of variances in respect of each element of cost and sales; control ratios.
CO5:	• understand management accounting issues of Responsibility accounting, Divisional performance measurement and Transfer pricing.
Paper 8:	**Business Law**
CO1:	• understand basic aspects of contracts for making the agreements, contracts and subsequently enter valid business propositions.
CO2:	• be able to recognize and differentiate the special contracts and identify their appropriate usage at varied business scenarios.
CO3:	• equip the students about the legitimate rights and obligations under The Sale of Goods Act
CO4:	• enable with skills to initiate entrepreneurial ventures as LLP
CO5:	• understand the fundamentals of Internet based activities under The Information and Technology Act.
Paper 9:	**Advertising**
CO1:	• To know the basics of marketing communication and the processes.
CO2:	• To develop an understanding of strategic and tactical level decisions involved in development of an advertisement and their application
CO3:	• To know about possible arrangements for organizing and evaluating advertising efforts
CO4:	• To understand the process involved in personnel selling, its management and its applications for relationship development.
CO5:	• To explain the decisions involved in planning and organizing the sales force.
CO6:	• To explain the decisions involved in sales force management and the related issues
Paper 10:	**Computer Programming**

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CO1:	• Understand the various concepts and terminologies used in computer networks and internet and be aware of the recent developments in the fast changing digital business world.
CO2:	• Handle document creation for communication.
CO3:	• acquire skills to create and make good presentations
CO4:	• make various computations in the area of accounting and finance and represent the business data using suitable charts. S/He should be able to manipulate and analyze the business data for better understanding of the business environment and decision making
CO5:	• understand and apply the various database concepts and tools in the related business areas with the help of suggested popular software
Paper 11:	**Auditing**
CO1:	• differentiate between different aspects of auditing especially for internal check, internal control and for overall corporate governance.
CO2:	• understand the concept of corporate governance in organizations and its essence for management.
CO3:	• provide and assimilate information leading to failure of organization and corporate scams.
CO4:	• comprehend the governance framework for an organization provided by different regulatory bodies in India and Abroad.
CO5:	• recognize the essence of ethics in business.
Paper 11:	**Cost Accounting**
CO1:	• understand thoroughly the conceptual framework of Cost Accounting; identification of differences between different financial and cost accounting; cost concepts and elements of cost; preparation of cost sheet.
CO2:	• understand the accounting and control of material and labour cost.
CO3:	• develop ability to understand classification, allocation, apportionment and absorption of overheads in cost determination; under and over absorption of overheads; treatment of various item of overheads
CO4:	• develop ability to calculate the cost of products, jobs, contracts, processes and services after understanding the basic concepts and processes involved in them.
CO5:	• understand cost accounting book keeping systems and reconciliation of cost and financial account profits
Paper 12:	**Direct and Indirect Taxation**
CO1:	• differentiate between various tax planning concepts and understand the procedure of assessment of corporate assesses.
CO2:	• understand tax planning with reference to business restructuring.

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CO3:	• To examine the causes of tax evasion and tax avoidance along with methods adopted by countries to curb tax evasion and avoidance
CO4:	• To assess the rationale, benefits and costs of various kinds of tax incentives offered by governments.
CO5:	• Assess impact of taxation on trade off of financial decisions
Paper 13:	**Export Marketing**
CO1:	• Envisage export marketing challenges and opportunities and developing an export marketing strategy.
CO2:	• Understand foreign consumer behavior and prepare export market plan.
CO3:	• Understand the product and pricing decisions for export marketing and describe methods of export pricing.
CO4:	• Explore the foreign markets and locate foreign customers.
CO5:	• Describe export documentation, cargo insurance and manage export operations .
CO6:	• Understand the role of export marketing facilitators for in foreign trade
Paper 14:	**Strategic Management**
CO1:	• To describe the role of Strategic Management
CO2:	• To understand various levels at which Strategy exist namely Corporate, Business and Functional level
CO3:	• To help students learn strategic management models
CO4:	• To analyze how organizations make decisions in response to rapid changes that occur due to environmental changes.
CO5:	• To analyze how firms make entry into global markets and implement and evaluate strategy at an International level.
Paper 15:	**Business Ethics & Corporate Social Responsibility**
CO1:	• To create a framework for effective corporate governance by understanding the role and responsibility of different stakeholders in large corporates and how their interplay results in alternate governance structures in different countries.
CO2:	• To appreciate the accountability of corporations towards its stakeholders and society and to create an integrated value framework for sustainability.
CO3:	• To serve as an effective board member, build professional boards and as senior managers contribute to strengthening board performance
CO4:	• To know about rights and responsibilities of shareholders.
CO5:	• To build and monitor systems that has strong internal control to prevent corporate frauds.
CO6:	• To appropriately address ethical issues such as conflicts of interest and insider trading.
CO7:	• To conduct board and company meetings and prepare corporate reports.
Paper 15:	**Research Methodology for Business**

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CO1:	• To describe the meaning and role of Business Research.
CO2:	• To formulate the research problem and understanding the major research designs.
CO3:	• To determine data sources and learn the art of designing a questionnaire.
CO4:	• To understand various sampling techniques and develop understanding of data collection and fieldwork.
CO5:	• To enable students to analyses data using various techniques and to learn how to communicate the results and follow up.
Paper 16:	**Corporate Financial Accounting**
CO1:	• develop an understanding of accounting for share capital and debentures
CO2:	• prepare financial statements of a company
CO3:	• develop an understanding of cash flow statements
CO4:	• understand the accounting for amalgamation and liquidation of companies
CO5:	• prepare consolidated balance sheet for Holding company
Paper 17:	**Financial Management**
CO1:	• explain the nature and scope of financial management as well as time value of money and risk return trade off
CO2:	• analyze capital budgeting process and capital budgeting techniques
CO3:	• estimate various capital structure theories and factors affecting capital structure decisions in a firm
CO4:	• critically examine various theories of dividend and factors affecting dividend policy
CO5:	• evaluate working capital requirement
Paper 18:	**Business Statistics**
CO1:	• acquire a fair degree of proficiency in comprehending statistical data, processing and analyzing it using descriptive statistical tools.
CO2:	• gather knowledge about various probability concepts and distributions and their business applications
CO3:	• understand the relationship between two variables using concepts of correlation and regression and its use in identifying and predicting the variables.
CO4:	• develop an understanding of the index numbers and their utility in daily life and stock market
CO5:	• become aware of the patterns revealed by the time series data and to use it to make predictions for the future.
Paper 19:	**Principles of Marketing**

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CO1:	• develop understanding of basic concepts of marketing, marketing philosophies and environmental conditions effecting marketing decisions of a firm.
CO2:	• understand the dynamics of consumer behavior and process of market selection through STP stages
CO3:	• understand and analyze the process of value creation through marketing decisions involving product development.
CO4:	• understand and analyze the process of value creation through marketing decisions involving product pricing and its distribution.
CO5:	• understand and analyze the process of value creation through marketing decisions involving product promotion and also to equip them with the knowledge of various developments in marketing area that may govern marketing decisions of a firm.
Paper 20:	**Industrial Law**
CO1:	• To understand the regulatory aspects and the broader procedural aspects involved in pensions and provident fund processes.
CO2:	• To acquaint the various compensatory benefits available to workers under state insurance act and understand the administration processes involved in the same.
CO3:	• To comprehend and analyses the working of pension, provident fund, state insurance or compliance departments of factories.
CO4:	• To comprehend and analyses the working of pension, provident fund, state insurance or compliance departments of factories.
CO5:	• To imbibe company processes with the implications of judicial pronouncements with respect to social security of workers via payment of gratuity
CO6:	• To familiarize with the rights and liabilities of trade unions in a factory and also making them aware of real life examples through judicial pronouncements.
CO7:	• To apprise the compensatory benefits available in case of employment injury in accordance with Indian statutes.
Paper 21:	**Business Mathematics**
CO1:	• comprehend the concept of systematic processing and interpreting the information in quantitative terms to arrive at an optimum solution to business problems.
CO2:	• develop proficiency in using different mathematical tools (matrices, calculus, linear programming, and mathematics of finance) in solving daily life problems.
CO3:	• acquire competence to use computer for mathematical computations, especially with Big data.
CO4:	• obtain critical thinking and problem-solving aptitude.
CO5:	• evaluate the role played by mathematics in the world of business and economy.
Paper 22:	**Business Environment**
CO1:	• to meet the challenges of changing business environment

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CO2:	• identifying business opportunities, tapping useful resources, assists in planning, and improves the overall performance, growth, and profitability of the business.
CO3:	• Understanding all elements that are external or internal to a company and that have a significant impact on its operation.
CO4:	• Learn to develop strategies to adapt to changes in the environment.
Paper 23:	**Principles of Management**
CO1:	• understand the evolution of management and apprehend its effect on future managers
CO2:	• analyze how organizations adapt to an uncertain environment and decipher decision making techniques managers use to influence and control the internal environment.
CO3:	• comprehend the changes happening in organization structure over time.
CO4:	• analyze the relationship amongst functions of management i.e. planning, organizing, directing and controlling.
CO5:	• appreciate the changing dynamics of management practice.
Paper 24:	**Information Technology in Business Management**
CO1:	• understand the fundamentals of Internet based activities under The Information and Technology Act.
CO2:	• Design and use spreadsheets and database applications for business processes and tracking. • to generate value through the use of technology
CO3:	• Learning to use Information Technology (IT) in business for transmitting, storing, manipulating and retrieving data.
Paper 25:	**Business Planning and Entrepreneurial Management**
CO1:	• To be familiarized with the fundamentals of entrepreneurship and its role in economic development and to motivate them towards entrepreneurial activities.
CO2:	• To understand the concept of entrepreneurial leadership and stimulate them to think innovative as entrepreneurs.
CO3:	• To write effective business plans for establishing and managing any business venture.
CO4:	• To know how to skills among students to raise the funding for the business from different sources for a startup venture.
CO5:	• To form a business entity in the light of the legal and regulatory framework in India.
Paper 26:	**Accounting and Managerial Decisions**
CO1:	• Identify differences between various forms of accounting—Financial, Managerial and Cost and the role of a Management Accountant
CO2:	• Identify cost according to their associated activities and apply costing techniques for computing cost of products or services
CO3:	• Prepare income statements using variable costing and absorption costing

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CO4:	• Make various managerial decisions on the basis of learning about concepts and issues involved therein
CO5:	• Prepare different forms of budgetary statements, identify and control cost at a responsibility center assigned to a manager, analyze and report performance of the assigned responsibility center.
Paper 27:	**Equity and Debt Market**
CO1:	• To understand the evolution, working and role of Debt Market in India.
CO2:	• To understand the role, functions of the various intermediaries and regulatory bodies.
CO3:	• To provide an overview of the Indian equity market, growth and development.
CO4:	• To understand the various components of primary and secondary market for equity in India
CO5:	• To understand the role and functions of the various intermediaries and regulatory bodies in the Indian Equity Market
Paper 28:	**Consumer Behaviour**
CO1:	• To understand consumer behaviour and its relationship with marketing concepts;
CO2:	• To understand the process of consumer decision making and its application;
CO3:	• To describe the underlying variables resulting into differences in consumer decision making;
CO4:	• To understand the attitude-behaviour relationship and its related models;
CO5:	• To know the socio-cultural factors affecting consumer decision making
Paper 29:	**Social Marketing**
CO1:	• Understand what social media is, the various channels through which it operates, and its role in marketing strategy
CO2:	• Use principles of consumer and social psychology to develop social media content and campaigns that engage consumers
CO3:	• Draw on knowledge about word-of-mouth marketing to develop effective approaches for propagating ideas, messages, products, and behaviors across social networks
CO4:	• Measure the impact of a social media campaign in terms of a specific marketing objective
Paper 30:	**Human Resource Management**
CO1:	• analyze the current theory and practice of recruitment and selection.
CO2:	• understand basic nature and importance of human resource management.
CO3:	• realize the importance of performance management system in enhancing employee performance.
CO4:	• recommend actions based on results of the compensation analysis and design compensation schemes that are cost effective, that increase productivity of the workforce, and comply with the legal framework.
CO5:	• understand role of modern HRM in meeting challenges of changing business environment.
Paper 31:	**Production & Total Quality Management**

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CO1:	• Gaining knowledge about managing production processes
CO2:	• Better understanding of modern production techniques
CO3:	• Better understanding of quality management.
CO4:	• To understand the basic concepts and theories of Total quality Management
CO5:	• To appreciate the importance of cost of quality.
CO6:	• To learn regarding changing or emerging market conditions and to environmental and other government regulations
Paper 32:	**Financial Institutions and Markets**
CO1:	• Understand the working of financial institutions and markets both individually and as an interlinked system.
CO2:	• Analyze bonds in terms of valuation, yields and risks as well as build up immunized bond portfolio.
CO3:	• Analyze equity shares using different approaches and models
CO4:	• Construct, analyze, select and evaluate portfolios along with a deep understanding of Capital market theory and associated models.
CO5:	• Understand and analyses futures and options, use various options trading strategies and critically examine various innovations in derivatives market.
Paper 33:	**Strategic Cost Management**
CO1:	• Describe strategic cost analysis techniques and apply these techniques for performance evaluation and managing a profitable and competitive enterprise.
CO2:	• Explain the concept of target costing, life costing techniques, and Kaizen costing.
CO3:	• Comprehend strategic decision using techniques in various spheres of organizational operations.
CO4:	• Know the price setting strategies and their implementation in terms of preparing of activity based budgets in comparison traditional budgets.
CO5:	• Understand the management of JIT system and decision making under constraints.
Paper 34:	**Rural Marketing**
CO1:	• to familiarize the students with conceptual understanding of Rural Marketing and its corresponding development practices in Indian context.
CO2:	• Expose the students to the rural market environment and the emerging challenges in the globalization of the economies
CO3:	• Acquaint the students with the appropriate concepts and techniques in the area of rural marketing.
CO4:	• Apply adaptations to the rural marketing mix (4 A's) to meet the needs of rural consumers.
CO5:	• Understand the concept and methodology for conducting the research in rural market

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Paper 35:	Integrated Marketing Communication
CO1:	• Examine how integrated marketing communications help to build brand identity and brand relationship and create brand equity through brand synergy.
CO2:	• Choose a marketing communication mix to achieve the communications and behavioral objectives of the IMC campaign plan.
CO3:	• Develop an integrated cross-media strategy and creative message and concept to reach the target audience and deliver the brand promise through an IMC campaign.
CO4:	• Structure an integrated marketing communications campaign plan based on the application of marketing concepts, principles, and practices within an organization.
CO5:	• Measure and critically evaluate the communications effects and results of an IMC campaign to determine its success.
Paper 36:	**Logistic & Supply Chain Management**
CO1:	• Describing fundamental supply chain management and logistics concepts at macro and micro levels.
CO2:	• Understanding the role of Relationship Marketing in SCM
CO3:	• Understand the foundational role of logistics as it relates to procurement, transportation, and warehousing and inventory.
CO4:	• Develop an understanding of Performance Measurement, Supply Chain Metrics (KPIs), Balanced Score Card Approach and Benchmarking.
CO5:	• Analyzing the importance of the third party and fourth party logistic outsourcing. Develop an understanding of the Technology in logistics and Green Supply Chain Management.
Paper 37:	**Corporate Communication & Public Relations**
CO1:	• Discuss the structure of Corporate Communication and its functions
CO2:	• Analyze the specialist areas of corporate communication like organizational relation, investor relation and community relation
CO3:	• Strategies corporate communication to reach out to public
CO4:	• Analyze, plan and conduct corporate strategy for image building and branding
CO5:	• Building and maintaining relationship with the media
Paper 38:	**Investment Analysis & Portfolio Management**
CO1:	• Understand the environment of investment and risk return framework.
CO2:	• Analyze bonds in terms of valuation, yields and risks as well as build up immunized bond portfolio.
CO3:	• Analyze equity shares using different approaches and models.
CO4:	• Construct, analyze, select and evaluate portfolios along with a deep understanding of capital market theory and associated models.
CO5:	• Understand and analyses futures and options, use various options trading strategies and critically examine various innovations in derivatives market.

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Paper 39:	Service Marketing
CO1:	• Identify critical issues in service delivery including identifying and managing customer service experiences, expectations, perceptions and outcomes
CO2:	• Identify critical issues in service design including the nature of service products &markets, building the service model, and creating customer value
CO3:	• To provide an in depth appreciation and understanding of the unique challenges inherent in managing and delivering quality services
CO4:	• • able to explain service blueprinting, the integration of new technologies, and other key issues facing today's customer service providers and service managers
Paper 40:	**E-Commerce and Digital Marketing**
CO1:	• identify and assess the impact of digital technology in transforming the business environment and also the customer journey.
CO2:	• understand how marketers think, conceptualize, test continuously to optimize their product search on digital platforms
CO3:	• illustrate how the effectiveness of a digital marketing campaign can be measured
CO4:	• demonstrate their skills in digital marketing tools such as SEO, Social media, and Blogging for engaging the digital generation.
CO5:	• appreciate the need for regulatory framework for digital marketing in India
Paper 41:	**Sales and Distribution Management**
CO1:	• To know the basics of marketing communication and the processes.
CO2:	• To develop an understanding of strategic and tactical level decisions involved in development of an advertisement and their application
CO3:	• To develop an understanding of strategic and tactical level decisions involved in development of an advertisement and their application
CO4:	• To know about possible arrangements for organizing and evaluating advertising efforts
CO5:	• To comprehend the ethical issues and social aspects of advertising
CO6:	• To understand the process involved in personnel selling, its management and its implications for relationship development.
CO7:	• To explain the decisions involved in planning and organizing the sales efforts.
CO8:	• To explain the decisions involved in sales force management and the related issues
Paper 42:	**Customer Relationship Management**
CO1:	• To make the students understand the organizational need, benefits and process of creating long-term value for individual customers
CO2:	• disseminate knowledge regarding the concept of e-CRM and e-CRM technologies.
CO3:	• To enable the students understand the technological and human issues relating to implementation of Customer Relationship Management in the organizations

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Paper 43:	**International finance**
CO1:	• Know the developments in accounting theory, financial reporting and disclosure practices at the national and international level.
CO2:	• Explain terms such as incomes, revenues, expense, losses, and gains.
CO3:	• Understand valuation of assets and liabilities and depreciation accounting according to different methods.
CO4:	• Understand valuation of intangible assets
CO5:	• Learn accounting standards and their construction, the state of the art developments in accounting standards worldwide and in India.
Paper 44:	**Strategic Human Resource Management**
CO1:	• To develop a perspective of Strategic Human Resource Management and be able to distinguish the strategic approach to human resources from the traditional functional approach.
CO2:	• To align the HR strategy with overall corporate strategy and to apply functional strategies of HR
CO3:	• To develop a theoretical base through existing research in the domain of SHRM and its practice.
CO4:	• To link HR with firm performance and evaluate HR effort.
CO5:	• To provide an overview of contemporary issues related to SHRM and its unfolding areas in future.
Paper 45:	**Industrial Relations**
CO1:	• To understand facets of interactions between the employer and the employees and the resultant disputes.
CO2:	• To imbibe how to interact, negotiate and transact with Trade Unions balancing and improving the relations between the employer and the employees.
CO3:	• To acquaint with the basic legal framework envisaged under the statutes for compensation and welfare of employees in different modes
CO4:	• To design and understand the Tax structure by the principals involved and premise of the grant of bonus, wages, and minimum wages to workers.
CO5:	• To provide the insights about reforms in industrial relations in India and also providing knowledge about the latest amendments in compensation laws in India.
Paper 46:	**Project Management**
CO1:	• familiarize with the concept of project management and its attributes
CO2:	• understand project planning and project analysis
CO3:	• perform project appraisal.
CO4:	• examine project risk and conduct performance assessment and quality management of the project

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CO5:	• learn cases in project management.
Paper 47:	**Indian Ethos in Management**
CO1:	• Know the relevance of Indian Ethos and management lessons from scriptures
CO2:	• Understand ethical codes and value system in the work culture
CO3:	• Know the approaches to leadership through Indian Traditions.
CO4:	• Understand different approaches of leadership from India.
CO5:	• Know contemporary Indian leadership practices as followed by leaders in modern organizations.
Paper 48:	**Brand Management**
CO1:	• to examine the brand concepts in real-life setting by articulating the context and the rationale for the application
CO2:	• to understand what role does first P-i.e. Product plays in the marketing mix
CO3:	• understand how a new product is developed and maintained
CO4:	• to apply creative and critical strategies and tactics involved in developing, positioning, leveraging, managing a brand, and measuring its value
CO5:	• Apply branding principles and marketing communication concepts and frameworks to achieve brand management goals and improve marketing performance
Paper 49:	**Retail Management**
CO1:	• Clarify the concept and related terms in retailing
CO2:	• Comprehend the ways retailers use marketing tools and techniques to interact with their customers.
CO3:	• Understand various formats of retail in the industry.
CO4:	• Recognize and understand the operations-oriented policies, methods, and procedures used by successful retailer in today's global economy.
Paper 50:	**Media Planning & Management**
CO1:	• Learners will perceive about Media Planning, Strategy and Management with reference to current business scenario.
CO2:	• To absorb the information related to the basic characteristics of all media to ensure most effective use of advertising budget
CO3:	• To comprehend an insight on Media Planning, Budgeting, Scheduling and Evaluating the Different Media Buys
CO4:	• To analyze international and domestic marketing and media metrics.

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B.Sc. Computer Science

3 year B.Sc. Computer Science Programme Objectives

- To develop an understanding and knowledge of the basic theory of Computer Science with good foundation on theory, systems and applications.
- To for necessary skills and analytical abilities for developing computer based solutions of real-life problems.
- To provide training in emergent computing technologies which lead to innovative solutions for industry and academia.
- To develop the necessary study skills and knowledge to pursue further post-graduate study in computer science or other related fields.
- To develop the professional skillset required for a career in an information technology oriented business or industry.
- To enable students to work independently and collaboratively, communicate effectively, and become responsible, competent, confident, insightful, and creative users of computing technology

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B.Sc. Computer ScienceCourse Outcome

	Semester I
Paper No.	**Paper Name**
USCS101	**Digital Systems & Architecture**
	After successful completion of this course, students would be able to • To learn about how computer systems work and underlying principles • To understand the basics of digital electronics needed for computers • To understand the basics of instruction set architecture for reduced and complex instruction sets • To understand the basics of processor structure and operation • To understand how data is transferred between the processor and I/O devices
USCSP102	**Introduction to Programming with Python**
	After successful completion of this course, students would be able to: • Ability to store, manipulate and access data in Python Ability to implement basic Input / Output operations in Python • Ability to define the structure and components of a Python program. • Ability to learn how to write loops and decision statements in Python. • Ability to learn how to write functions and pass arguments in Python. • Ability to create and use Compound data types in Python
USCS103	**LINUX Operating System**
	After successful completion of this course, students would be able to • Work with Linux file system structure, Linux Environment • Handle shell commands for scripting, with features of regular expressions,redirections • Implement file security permissions • Work with vi, sed and awk editors for shell scripting using various controlstructures • Install softwares like compilers and develop programs in C and Python programming languages on Linux Platform
USCS104	**Open Source Technologies**
	• Differentiate between Open Source and Proprietary software and Licensing. • Recognize the applications, benefits and features of Open-Source Technologies • Gain knowledge to start, manage open-source projects.

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USCS105	**Discrete Mathematics**
	After successful completion of this course, • learners would be able to: Define mathematical structures (relations, functions, graphs) and use them to model real life situations. • Understand, construct and solve simple mathematical problems. • Solve puzzles based on counting principles. • Provide basic knowledge about models of automata theory and the corresponding formal languages. • Develop an attitude to solve problems based on graphs and trees, which are widely used in software.
USCS106	**Descriptive Statistics**
	After successful completion of this course, learners would be able to • Organize, manage and present data. • Analyze Statistical data using measures of central tendency and dispersion. • Analyze Statistical data using basics techniques of R. • Study the relationship between variables using techniques of correlation and regression.
USCS107	**Soft Skills**
	• Learners will be able to understand the importance and types softskills • Learners will develop skills for Academic and Professional Presentations. • Learners will able to understand Leadership Qualities and Ethics. • Ability to understand the importance of stress management in their academic & professional life.

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B.Sc. Computer ScienceCourse Outcome

Semester II

USCS201	**Design & Analysis of Algorithms**
	After successful completion of this course, • Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used. • Students should be able to appreciate the use of various data structures as per need • To select, decide and apply appropriate design principle by understanding the requirements of any real life problems
USCS202	**Advanced Python Programming**
	• To learn how to design object-oriented programs with Python classes. • To learn about reading, writing and implementing other operation on files inPython. • To implement threading concept and multithreading on Python • To design GUI Programs and implement database interaction using Python. • To know about use of regular expression and handling exceptions for writing robust python programs.
USCS203	**Introduction to OOPs using C++**
	After successful completion of this course, students would be able to Work with numeric, character and textual data and arrays. • Understand the importance of OOP approach over procedural language. • Understand how to model classes and relationships using UML. • Apply the concepts of OOPS like encapsulation, inheritance and polymorphism. • Handle basic file operations.
USCS204	**Database Systems**
	After successful completion of this course, students would be able to • To appreciate the importance of database design. • Analyze database requirements and determine the entities involved in the system and their relationship to one another. • Write simple queries to MySQL related to String, Maths and Date Functions. • Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands. • Understand the normalization and its role in the database design process. • Handle data permissions. Create indexes and understands the role of Indexes in optimization search.
USCS205	**Calculus**
	After successful completion of this course, • learners would be able to: Develop mathematical skills and enhance thinking power of learners. • Understand mathematical concepts like limit, continuity, derivative, integration of functions, partial derivatives. • Appreciate real world applications which use the learned concepts. • Skill to formulate a problem through Mathematical modelling and simulation.
USCS206 Statistical Methods	

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	After successful completion of this course, learners would be able • to Calculate probability, conditional probability and independence. • Apply the given discrete and continuous distributions whenever necessary. • Define null hypothesis, alternative hypothesis, level of significance, test statistic and pvalue. • Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. • Apply non-parametric test whenever necessary. • Conduct and interpret one-way and two-way ANOVA.
USCS207	**E-Commerce & Digital Marketing**
	After successful completion of this course, students would be able • to Understand the core concepts of E-Commerce. • Understand the various online payment techniques • Understand the core concepts of digital marketing and the role of digital marketing in business. • Apply digital marketing strategies to increase sales and growth of business • Apply digital marketing through different channels and platforms • Understand the significance of Web Analytics and Google Analytics and apply thesame.

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B.Sc. Computer ScienceCourse Outcome

Semester III

USCS301	**Principles of Operating Systems**
	After successful completion of this course, students would be able to • Work with any type of operating system • Handle threads, processes, process synchronization • Implement CPU scheduling algorithms • Understand the background role of memory management • Design file system
USCS302	**Linear Algebra**
	After successful completion of this course, students would be able to • Appreciate the relevance and applications of Linear Algebra in the field of Computer Science. • Understand the concepts through program implementation. • Instill a computational thinking while learning linear algebra. • Express clear understanding of the concept of a solution to a system of equations. • Find eigenvalues and corresponding eigenvectors for a square matrix.
USCS303	**Data Structures**
	After successful completion of this course, students would be able to- ● Create different types of data structures. ● Understand which data structure to be used based on the type of the problem. ● Apply combined knowledge of algorithms and data structures to write highly effective programs in various domains.
USCS304	**Advanced Database Concepts**
	After successful completion of this course, students would be able to • To develop understanding of concepts and techniques for data management and learn about widely used systems for implementation and usage. • To develop understanding of Transaction management and crash recovery. • To develop concepts of programming concepts of database.
USCS305	**Java based Application Development**
	After successful completion of this course, students would be able to • Design basic application in java using Graphical User Interface. • The learner will be able to develop applications using swings • The learner will be able to develop web based applications using servlet and jsp • The learner will be able to connect databases with java through • The learner will be able to perform programs using JSON objects

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USCS306	**Web Technologies**
	• After successful completion of this course, students would be able to • Design valid, well-formed, scalable, and meaningful pages using emerging technologies. • Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites • Develop and implement client-side and server-side scripting language programs. • Develop and implement Database Driven Websites. Design and apply XML to create a markup language for data and document centric applications.
USCS3071	**Creative Content Writing**
	After successful completion of this course, students would be able to • Understand the fundamentals of content creation for Blog, Website etc. • Acquire the ability to write and edit in a variety of styles and procedures • To develop the creative abilities. • To acquire essential language skills for editors.
USCS3072	**Green Technologies**
	After successful completion of this course, students would be able to • Explain drivers and dimensions of change for Green Technology • Appreciate Virtualization; smart meters and optimization in achieving green IT • Gain knowledge about green assets, green processes, and green enterprise architecture • ISO 14001 and related standards for Audit for Green Compliance

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B.Sc. Computer ScienceCourse Outcome

Semester IV

USCS401	**Theory of Computation**
	After successful completion of this course, students would be able to • Understand Grammar and Languages • Learn about Automata theory and its application in Language Design • Learn about Turing Machines and Pushdown Automata • Understand Linear Bound Automata and its applications
USCS402	**Computer Networks**
	After successful completion of this course, students would be able to • Learn basic networking concepts and layered architecture. • Understand the concepts of networking, which are important for them to be known as a 'networking professionals'.
USCS403	**Software Engineering**
	After successful completion of this course, students would be able to • Plan a software engineering process life cycle, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements • Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology. • Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice • Able to use modern engineering tools necessary for software project management, time management and software reuse.
USCS404	**IoT Technologies**
	After successful completion of this course, students would be able to ● understand SoC and IoT ● use different types of IoT Platforms and interfaces ● understand and implement an idea of various types of applications built using IoT
USCS405	**Android Application Development**
	After successful completion of this course, students would be able to • Build useful mobile applications using Kotlin language on Android • Install and configure Android Studio for application development • Master basic to intermediate concepts of Kotlin required for mobile application development • Use built-in widgets and components, work with the database to store data • Master key Android programming concepts and deploy the application on Google Play

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USCS406	**Advanced Application Development**
	After successful completion of this course, students would be able to • Store the data in NoSQL, document-oriented MongoDB database that brings performance and scalability. • Use Node.js and Express Framework for building fast, scalable network applications • Use AngularJS framework that offers declarative, two-way data binding for web applications. • Integrate the front-end and back-end components of the MEAN stack. Develop robust mobile applications using Flutter.
USCS4071	**Research Methodology**
	After successful completion of this course, students would be able to • Define research, formulate problem and describe the research process and research methods. • Understand and apply basic research methods including research design, data analysis and interpretation. • Understand ethical issues in research, write research report, research paper and publish the paper
USCS4072	**Management & Entrepreneurship**
	After successful completion of this course, students would be able to • Understand the meaning of management, functions, administration and its process. • Understand the foundation of entrepreneurship and its theory, types and its process. • Identify the steps involved in an entrepreneurial venture (SSI). • Understand an entrepreneur is converting his business ideas into running concern by selecting the project.

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B.Sc. Computer ScienceCourse Outcome

SEMESTER V

USCS501	Artificial Intelligence
	After completion of this course, learner should get • a clear understanding of AI and different search algorithms used for solving problems. • The learner should also get acquainted with different learning algorithms and models used in machine learning.
USCS502	**Linux Server Administration**
	• Learner will be able to develop Linux based systems and maintain. • Learner will be able to install appropriate service on Linux server as per requirement. • Learner will have proficiency in Linux server administration.
USCS503	**Software Testing and Quality Assurance**
	• Understand various software testing methods and strategies. • Understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software. • Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance.
USCS504	**Information and Network Security**
	• Understand the principles and practices of cryptographic techniques. • Understand a variety of generic security threats and vulnerabilities, and identify & analyze particular security problems for a given application. • Understand various protocols for network security to protect against the threats in a network •
USCS505	**Architecting of IoT**
	• Learners are able to design & develop IoT Devices. • They should also be aware of the evolving world of M2M Communications and IoT analytics.
USCS506	• Emphasis on SOAP based web services and associated standards such as WSDL. • Design SOAP based / RESTful / WCF services Deal with Security and QoS issues of Web Services
USCS507	**Game Programming**
	• Learner should study Graphics and gamming concepts with present working style of developers where everything remains on internet and they need to review it, understand it, be a part of community and learn.

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B.Sc. Computer ScienceCourse Outcome

SEMESTER VI

USCS601	**Wireless Sensor Networks and Mobile Communication**
	• After completion of this course, learner should be able to list various applications of wireless sensor networks, describe the concepts, protocols, design, implementation and use of wireless sensor networks. • Also implement and evaluate new ideas for solving wireless sensor network design issues.
USCS602	**Cloud Computing**
	• After successfully completion of this course, learner should be able to articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing using open source technology. • Learner should be able to identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. • They should explain the core issues of cloud computing such as security, privacy, and interoperability.
USCS603	**Cyber Forensics**
	• The student will be able to plan and prepare for all stages of an investigation - detection, initial response and management interaction, investigate various media to collect evidence, report them in a way that would be acceptable in the court of law.
USCS604	**Information Retrieval**
	• After completion of this course, learner should get an understanding of the field of information retrieval and its relationship to search engines. • It will give the learner an understanding to apply information retrieval models.
USCS605	**Digital Image Processing**
	• Learner should review the fundamental concepts of a digital image processing system. • Analyze the images in the frequency domain using various transforms. Evaluate the techniques for image enhancement and image segmentation. • Apply various compression techniques. They will be familiar with basic image processing techniques for solving real problems.
USCS606	**Data Science**
	• After completion of this course, the students should be able to understand & comprehend the problem; • and should be able to define suitable statistical method to be adopted.
USCS607	**Ethical Hacking**
	• Learner will know to identify security vulnerabilities and weaknesses in the target applications. • They will also know to test and exploit systems using various tools and understand the impact of hacking in real time machines.

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B.Sc. Information Technology

3 year B.Sc. Information Technology Programme Objectives

- To develop the logical ability of the student.
- Basic concepts to be cleared using suitable examples.
- Different approach towards the problem.
- To handle the errors and find suitable solution.
- Debugging the code
- Course will provide students with an overview of discrete mathematics.
- Students will learn about topics such as logic and proofs, sets and functions, recursion, graph theory, tress and other important discrete math concepts

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B.Sc. Information Technology
Course outcomes

Semester-I

Course Code	Course Title
USIT101	**Programming Principles with C**
	Course Outcomes: Learners will be able to, • Learn the basic principles of programming. • Develop of logic using algorithm and flowchart. • Acquire the information about data types. • Understanding of input and output functions. • Enhance advanced concepts using program.
USIT102	**Digital Logic and Applications**
	Course Outcomes: Learners will be able to, • Apply number conversion techniques in real digital systems • Solve Boolean algebra expressions • Derive and design logic circuits by applying minimization in SOP and POS forms • Design and develop Combinational and Sequential circuits • Understand and develop digital applications
USIT103	**Fundamentals of Database Management Systems**
	Course Outcomes: Learners will be able to, • Define and describe the fundamental elements of relational database management system. • To relate the basic concepts of relational data model, entity-relationship model, relational database • design, relational algebra and SQL. • Design ER-models to represent simple database application scenarios. • Transform the ER-model to relational tables, populate relational database and formulate SQL • queries on data. • Improve the database design by normalization. • Understand basic database storage structures and access techniques: file and page organizations, indexing methods and hashing

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USIT104	**Computational Logic and Discrete Structure**
	Course Outcomes: Learners will be able to: • Use logical notation • Perform logical proofs • Apply recursive functions and solve recurrence relations • Use graphs and trees • Apply basic and advanced principles of counting • Define sets and Relations • Calculate discrete probabilities.
USIT105	**Technical Communication Skills**
	Course Outcome: Learners will be able to, • Analyse, synthesize and utilize the process and strategies from delivery to solving • communication problem. • Learn the communication methodologies at workplace and learning about importance of • team collaboration. • Learn about different technical communication such as presentations and interviews. • Understand and apply the art of written communication in writing reports, proposals. • Ground rules of ethical communication and MIS. • Understand the functions of graphs, maps, charts.

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Semester-II

Course Code	Course Title
USIT201	**Object Oriented Programming with C++**
	Course Outcomes: • Understanding of Python basics: Students will have a solid foundation in Python syntax, data types, variables, and basic operations. • Problem-solving skills: Students will develop the ability to analyse problems and implement effective solutions using Python programming techniques. • Proficiency in control flow: Students will be able to use conditional statements (if-else) and loops (for, while) to control the flow of their programs.
USIT202	**Fundamentals of Micro Processor and Microcontroller**
	Course Outcomes: • Understanding Microprocessors and Microcontrollers: Students will gain a solid understanding of the basic concepts, components, and architecture of microprocessors and microcontrollers. • Programming Skills: Students will develop programming skills specific to microprocessors and microcontrollers, including the ability to write and debug assembly language code and C/C++ code for embedded systems. • Hardware Interfacing: Students will learn how to interface microprocessors and microcontrollers with various peripheral devices such as sensors, actuators, displays, and memory devices. • System Design and Integration: Students will acquire the knowledge and skills necessary to design and integrate microprocessor-based systems, including selecting appropriate components, designing interfaces, and troubleshooting.
USIT203	**Web Applications Development**
	Course Outcomes: • Understanding of web development fundamentals: Students will gain knowledge of HTML, CSS, and JavaScript, which are the fundamental building blocks of web development. • Proficiency in front-end development: Students will learn how to create user interfaces using HTML and CSS, and implement interactivity using JavaScript. They will be able to design visually appealing and user-friendly web applications. • Back-end development skills: Students will be introduced to server-side programming languages such as PHP, Python, or Node.js.

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	how to handle data, perform server-side operations, and build dynamic web applications. • Database integration: Students will understand how to integrate databases into web applications, allowing for data storage, retrieval, and manipulation. They will learn how to interact with databases using SQL or NoSQL queries..
USIT204	**Numerical Methods**
	Course Outcomes: Learners will be able to, • Understand numerical techniques to find the roots of non-linear equations and solution of system of • linear equations. • Understand the difference operators and the use of interpolation. • Understand numerical differentiation and integration and numerical solutions of ordinary and • partial differential equations.
USIT205	**Green IT**
	Course Outcomes: • Understand the concept of Green IT: Students will gain knowledge about the principles and importance of Green IT, including the environmental and sustainability aspects of information technology. • Identify energy-efficient practices: Students will learn how to identify and implement energy-saving practices in IT infrastructure, such as optimizing server usage, utilizing virtualization, and implementing power management techniques. • Explore sustainable hardware and software solutions: Students will explore environmentally friendly hardware components and software applications that promote energy efficiency, resource conservation, and reduced electronic waste.

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Semester-III

Course Code	Course Title
USIT301	**Python Programming**
	Course Outcomes: • Understanding the Basics: Students will gain a solid understanding of the fundamental concepts of Python programming, such as variables, data types, operators, control structures (loops and conditionals), and functions. • Syntax and Language Features: Students will learn the syntax and various language features of Python, including input/output operations,string manipulation, list manipulation, dictionaries, and file handling. • Problem Solving: Students will develop problem-solving skills by applying Python programming concepts to solve a variety of programming problems and exercises. • Algorithmic Thinking: Students will learn how to analyse problems and design efficient algorithms to solve them using Python. This includes understanding concepts like loops, recursion, sorting, searching, and basic data structures.
USIT302	**Data Structures**
	Course Outcomes: • Understand the fundamental concepts of data structures, including arrays, linked lists, stacks, queues, trees, and graphs. • Demonstrate the ability to analyse and evaluate the efficiency of different data structures and their associated operations. • Apply appropriate data structures to solve real-world problems, such as searching, sorting, and manipulating data. • Implement various data structures using a programming language, suchas C++, Java, or Python.
USIT303	**Computer Networks**
	Course Outcomes. • Proficiency in Network Design and Configuration: Students will learn how to design and configure local area networks (LANs) and wide area networks (WANs) using appropriate network devices and technologies. • Knowledge of Network Security: Students will acquire an understanding of network security threats, vulnerabilities, and countermeasures. They will learn about network security protocols, encryption techniques, and best practices for securing computer networks. • Ability to Troubleshoot Network Issues: Students will develop skills in diagnosing and resolving common network problems, such as connectivity issues, performance degradation, and configuration errors.They will learn troubleshooting methodologies and tools to identify andfix network issues effectively.

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USIT304	**Database Management Systems**
	Course Outcomes: • Gain knowledge of the different components and architecture of a DBMS, such as storage management, query processing, and transaction management. • Develop skills in creating and manipulating databases using SQL (Structured Query Language) for data definition, data manipulation, and data control. • Learn to design and implement efficient and normalized relational database schemas. • Acquire an understanding of indexing techniques and query optimization to improve the performance of database queries.
USIT305	**Applied Mathematics**
	Course Outcomes: • Problem-solving Skills: Students will enhance their problem-solving abilities by applying mathematical techniques to real-world scenarios. They will learn to analyse problems, formulate mathematical models, and employ appropriate methods to find solutions. • Data Analysis and Interpretation: Students will gain proficiency in analysing and interpreting data using mathematical tools and techniques. They will learn to extract meaningful insights from data sets, identify patterns, and make informed decisions based on quantitative analysis. • Mathematical Modelling: Students will learn the art of constructing mathematical models to represent and solve real-world problems. They will understand the process of simplifying complex situations into mathematical equations and utilizing them for predictions and optimization

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Semester-IV

Paper No.	Paper Name
USIT401	**Core Java**
	Course Outcomes: • Develop the ability to write and execute basic Java programs. • Gain knowledge of object-oriented programming (OOP) concepts such as classes, objects, inheritance, and polymorphism. • Learn how to create and use methods in Java to perform specific tasks. • Explore control flow statements, including loops and conditional statements, to implement decision-making and repetition in programs.
USIT402	**Introduction to Embedded Systems**
	Course Outcomes: • Knowledge of Hardware and Software Components: Students should gain knowledge of the hardware and software components that constitute embedded systems, including microcontrollers, sensors, actuators, and programming languages commonly used in embedded systems development. • Familiarity with Programming for Embedded Systems: Students should be able to write and compile basic programs for embedded systems using appropriate programming languages such as C or C++. They should understand the concepts of real-time programming, memory management, and communication protocols. • Understanding of Embedded System Design: Students should learn the fundamentals of embedded system design, including requirements analysis, system architecture, and trade-offs involved in designing embedded systems.
USIT403	**Computer Oriented Statistical Techniques**
	Course Outcomes. • Data Exploration and Visualization: Participants will learn how to explore and visualize data using computer software, such as statistical packages or programming languages like R or Python. They will acquire skills to create plots, charts, and graphs to effectively present and analyse data. • Statistical Analysis Techniques: Participants will be introduced to various statistical analysis techniques, including descriptive statistics, inferential statistics, regression analysis, analysis of variance (ANOVA), and non-parametric methods. They will learn how to apply these techniques using computer software. • Software Proficiency: Participants will develop proficiency in using statistical software tools to perform data analysis. This may include software like SPSS, SAS, R, or Python libraries like pandas and Numpy.

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USIT404	**Software Engineering**
	Course Outcomes: • Develop skills in requirements analysis and software design techniques. • Learn different software testing methodologies and practices. • Acquire proficiency in programming languages and software development tools. • Understand the importance of software quality assurance and implement quality control measures.
USIT405	**Computer Graphics and Animation**
	Course Outcomes: • Proficiency in 2D Graphics: Students will develop skills in creating 2D graphics using software tools such as Adobe Photoshop or Illustrator. They will learn techniques for creating illustrations, logos, and other visual assets. • Introduction to 3D Modelling: Students will learn the basics of 3D modelling, including creating and manipulating 3D objects, applying textures and materials, and working with lighting and cameras. • Animation Techniques: Students will explore different animation techniques, such as key framing, rigging, and character animation. They will learn how to bring static objects and characters to life through motion

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Semester-V

Course Code	Course Title
USIT501	**Software Project Management**
	Course Outcomes: • Understanding project management principles: Students will gain a basic understanding of project management concepts, including project planning, scheduling, budgeting, and resource management. • Familiarity with project management tools: Students will learn to use software tools and methodologies commonly used in software project management, such as project management software, version control systems, and bug tracking systems. • Effective project planning: Students will be able to develop a projectplan, including defining project scope, setting project goals and objectives, identifying deliverables, and creating a work breakdown structure. • Project scheduling and time management: Students will learn techniquesfor creating and managing project schedules, including task estimation, critical path analysis, and resource allocation.
USIT502	**Internet of Things**
	Course Outcomes: • IoT Device Programming: Students will learn how to program and configure IoT devices using programming languages such as Python orJavaScript. They will acquire the skills to develop code for sensor integration, data collection, and device communication. • IoT Security: Participants will explore the unique security challenges associated with IoT and learn strategies to mitigate risks. They will understand concepts such as authentication, encryption, secure communication protocols, and device management. • Data Analytics for IoT: Students will learn how to collect, process, and analyse data generated by IoT devices. They will gain knowledge of datavisualization techniques and tools to extract valuable insights from IoT data streams.
USIT503	**Advanced Web Programming**
	• Course Outcomes. • Developing complex web applications: Students will learn how to build complex and dynamic web applications using advanced programming languages and frameworks such as JavaScript, Python, Ruby on Rails, or Node.js. • Implementing responsive design: Students will be able to create web applications that adapt and respond to different screen sizes and devices, providing a seamless user experience across desktops, tablets,and mobile devices.

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	• Integrating APIs and web services: Students will learn how to integrate third-party APIs (Application Programming Interfaces) and web services into their web applications, enabling functionalities like social media integration, payment gateways, and data retrieval from external sources.
USIT504	**Artificial Intelligence**
	Course Outcomes: • Practical AI Applications: Develop the ability to identify real-world problems that can be solved using AI techniques and learn how to apply AI algorithms and tools to solve those problems effectively. • Hands-on Experience: Acquire practical skills by working on AI projects and exercises, utilizing popular AI libraries and frameworks. This includes tasks like data pre-processing, model training, and evaluation. • Ethical Considerations: Explore the ethical implications of AI technologies, such as fairness, transparency, and bias, and learn how to design AI systems that adhere to ethical standards
USIT505	**Linux System Administration**
	Course Outcomes: • Installation and Configuration: Students will learn how to install and configure Linux distributions, set up user accounts and permissions, and manage system services. • System Monitoring and Troubleshooting: Students will acquire skills in monitoring system performance, identifying and resolving common issues, and implementing troubleshooting techniques in a Linux environment. • Networking and Security: Students will explore networking concepts in Linux, including configuring network interfaces, managing firewalls, and implementing security measures such as user authentication and access control.

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Semester-VI

Course Code	Course Title
USIT601	**Software Quality Assurance**
	Course Outcomes: • Familiarity with various software development methodologies and their impact on quality assurance processes. • Knowledge of different types of software defects and how to identify, report, and track them effectively. • Proficiency in creating test plans, test cases, and test scripts to ensure comprehensive software testing. • Ability to execute different testing techniques, such as functional testing, regression testing, and performance testing.
USIT602	**Security in Computing**
	Course Outcomes: • Identify common threats and vulnerabilities in computer systems and networks. • Explain different types of attacks, such as malware, social engineering, and network-based attacks. • Analyse security risks and evaluate potential countermeasures for protecting computer systems. • Demonstrate knowledge of encryption algorithms and their applications in securing data.
USIT603	**Business Intelligence**
	Course Outcomes. • Data Gathering and Preparation: Participants will learn techniques for collecting, cleansing, and preparing data for analysis. They will be able to identify relevant data sources and understand the importance of data quality. • Data Visualization and Reporting: Students will acquire skills in creating meaningful and visually appealing reports and dashboards. They will learn how to present data in a way that effectively communicates insights and supports decision-making. • Business Intelligence Tools and Technologies: Participants will be introduced to popular business intelligence tools and technologies, such as Tableau, Power BI, or Elkview. They will learn how to navigate these tools and leverage their capabilities for data analysis and visualization. • Data Analysis and Interpretation: Students will develop the ability to analyse and interpret data to extract meaningful insights. They will learn various analytical techniques, such as statistical analysis, data mining, and predictive modelling.

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USIT604	**Principles of Geographic Information Systems**
	Course Outcomes: • GIS Data Collection and Management: Students should learn various methods of collecting and managing GIS data, such as digitizing, GPS data collection, and data conversion. • Spatial Analysis: Students should be able to perform basic spatial analysis tasks, including overlaying and analysing multiple data layers, buffering, and proximity analysis. • Map Creation and Visualization: Students should acquire skills in creating maps using GIS software, including selecting appropriate zymology, labelling, and cartographic design principles. • GIS Data Query and Retrieval: Students should learn how to query GIS data to retrieve specific information based on attribute queries and spatial queries.
USIT605	**Enterprise Networking**
	Course Outcomes: • Configuring Network Devices: Students will learn how to configure and manage network devices such as routers, switches, and firewalls. They will be able to implement basic network configurations and troubleshoot common issues. • Implementing Network Security: Participants will acquire knowledge about network security best practices and be able to implement security measures such as access control, encryption, and intrusion detection systems. • Designing Scalable Networks: Students will learn techniques for designing and implementing scalable networks that can accommodate future growth and changing business requirements. • Troubleshooting Network Issues: Participants will develop skills in identifying and resolving network-related problems, using diagnostic tools and techniques to troubleshoot issues effectively.

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3 years B.Sc. Botany Programme Objectives

- Students will acquire a comprehensive understanding of plant anatomy, physiology, taxonomy, ecology, genetics, and evolution. They will gain knowledge about the structure and function of plants at various levels, from molecular to ecosystem levels.
- Students will develop practical skills in conducting experiments, collectingand analyzing data, and using scientific equipment commonly employed in botany research. They will learntechniques such as microscopy, DNA analysis, plant tissue culture, and plant identification.
- Students will have opportunities to engage in fieldwork, where they will learn to identify different plant species, study plant communities, and analyze ecological interactions. Theywill gain proficiency in using field guides, mapping techniques, and ecological sampling methods.
- Students will learn to critically analyze scientific literature, design experiments, and formulate research questions. They will develop skills in data interpretation, statisticalanalysis, and scientific writing. These skills will prepare them for potential careers in research or further study at the graduate level.

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Course Outcome of F.Y.B.Sc. Botany.

Semester-I

Course Code: USBO101
Course Title: Plant Diversity I
Outcome of the Course: On successful completion of this course the student will be able to understand: • Introduce students to algae and let them explore the diversity in the thallus structure ranging from simple to complex. Learn the taxonomy of Chlorophyta represented by Spirogyra. Also create awareness about utility of algae in industries like production of nutraceuticals, biofuel green fuel technology. • Understanding the diversity of lower plants, its life cycle, type of chloroplast and application of algae for commercial purposes. • Introduction to fungi from simple Phycomycetes represented by Rhizopus life cycle. Modes of nutrition in fungi and economic importance of fungi to enable students to think about strain selection. • Detailed study of fungi life cycle, mode of nutrition and its selection for economic products. • Bryophytes amphibious habitat progressing towards land habitat features of bryophytes general characters of Hepaticae and life cycle of widely available Riccia. • Detailed study of bryophytes life cycle, types of thallus and alternation of generations. Plant succession

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Course Code: USBO102
Course Title: Form and Function I
Outcome of the Course: On successful completion of this course the student will be able to understand: • 1. Introduction to cell Biology ultrastructure of cell wall, plasma membrane, to understand the transport mechanisms via these membranes. 2. • Basic concept of cell and its ultra-microscopic structure of cell organelle. 3. • Describe the ultrastructure of mitochondria and micro bodies so that they are able to correlate with the physiological functions of these organelles in the plant cell. 3. • In correlation to study of organelles the biochemical pathway in these organelles will be studied. To make students understand that various substrates can be utilized in respiration – aerobic, anaerobic and fermentation, Concept of anabolism and catabolism. • To understand the concept of water transport in plant cells. • To understand the concept of Mendelian inheritance selection of model organism. Explanation of monohybrid and dihybrid crosses. • Terminologies used in genetics, test cross and backcross. • Detailed study of aerobic and anaerobic respiration and different respiratory substrates. • To go beyond Mendelian inheritance and understand the concept of genetic interaction, epistatic interactions, multiple alleles and inheritance of blood groups in man. • Detailed study of Mendelian genetics, multiple alleles and epistatic and non-epistatic interactions. Genetic basis of cultivars.

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Course Outcome of F.Y.B.Sc. Botany.

Semester-II

Course Code: USBO201
Course Title: Plant Diversity
Outcome of the Course: On successful completion of this course the student will be able to understand: • Land plants, first vascular plants Pteridophytes. Study of Nephrolepis to understand the stages of life cycle and alternation of generations. • Detailed study of first land plants - systematic position, life cycle, and alternation of generations. • Gymnosperms identify the characters. Structure life cycle of a commonly grown gymnosperm Cycas to understand the stages of life cycle. • Detailed study of gymnosperms Chamberlain classification, life cycle, plant body and alternation of generations. • Morphological modifications of root leaves and seed morphology and seed germination so as to understand their function and taxonomic relevance. Seed morphology would help them understand the storage of primary metabolites; germination would enable them to develop skills needed for nursery. • Understanding the type of modifications of roots, stems, leaves and morphology of seedmonocot and dicot. To apply the gained information to understand plant propagation and nutritional value of plant parts used as food. • Bentham and Hooker's system of classification. Introduction to plant families by study of family Malvaceae and Amaryllidaceae. • Study of Bentham and Hooker's classification for Malvaceae, Amaryllidaceae family.

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Course Code : USBO202

Course Title : Form and Function

Outcome of the Course : On successful completion of this course the student will be able to understand:

- Anatomy of plants, cells, tissues, salient characters of simple and complex tissues. Explain the primary structure of dicot and monocot root, stem and leaf. To allow the students to understand the difference in the anatomy of dicot and monocot, learn to apply this knowledge in identification of isolated plant organs.
- Detailed study of anatomical structures of plant tissues, root, stem, leaf and types of epidermis.
- Study of epidermal outgrowths and stomata of dicot and monocot leaves.
- Ecological study of energy pyramid, energy flow, types of ecosystem and biogeochemical cycles.
- Ecology: Study of flow of energy at different trophic levels. Study of aquatic and terrestrial ecosystems, biogeochemical cycles.
- Medicinal Botany: To understand the concept of primary and secondary metabolites. Ingredients of grandma's pouch and its medicinal uses.
- Study of difference of primary and secondary metabolites, some medicinal use of secondary products.

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Course Outcome of S.Y.B.Sc. Botany.

Semester-III

Course Code: USBO301
Course Title: PLANT DIVERSITY I
Outcome of the Course: After the completion of the course, Students will be able to: • Identify type of thallus in algae • Correlate evolution of sex in algae • Explore life cycle of Diatoms • Use algae in various application • Different Classification systems • Identify plants based on key characteristics of the families. • Modern techniques of plant preservation • Instrumentation like microscopy, chromatography, electrophoresis.

Course Code: USBO302
Course Title: FORMAS AND FUNCTIONS
Outcome of the Course : After the completion of the course, Students will be able to: • Identify different cell organelles and its functions • Process of cell devision, Mitosis, Miosis • Structure and function od DNA & RNA • Genetics chromosomal aberrations, linkage and organelle heredity • Molecular biology and its concept, DNA replication process in prokaryotes and eukaryotes • Translation process

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Course Code: USBO303
Course Title: CURRENT TRENDS IN PLANT SCIENCES
Outcome of the Course: After the completion of the course, Students will be able to: • Indian pharmacopeia, Ayurvedic pharmacopeia and its concept • Plant Secondary metabolites and its importance, Monograph and adulterations and substitution, • Different types of forest, Forestry and forest products • Aromatherapy, Nutaceuticals, Biofule

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Semester-IV

Course Code : USBO401
Course Title : PLANT DIVERSITY
Outcome of the Course : After the completion of the course, students will be able to: • Distinguish between genera of Ascomycetes • Identify stages in lifecycle of Aspergillus • Recognize fungal diseases; powdery mildew and late blight • Identify , classify and compare the characters of Pteridophyta. • Paleobotany - Geological time scale, fossils, Rhynia • Identify, classify Gymnosperms and life cycle of Pinus

Course Code : USBO 402
Course Title:- FORMS AND FUNCTIONS
Outcome of the Course : After the completion of the course, students will be able to: • To locate normal secondary growth in dicot stem and root • To identify mechanical tissue in different stress • To identify defense mechanism in plants • To compare stellar evolution in plants • Design strategies for restoration of ecosystem. • To apply and achieve sustainable development goals.

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Course Code:USMT 403
Course Title: CURRENT TRENDS IN PLANT SCIENCES
Outcome of the Course: After the completion of the course, students will be able to: • Design Garden layouts. • Develop entrepreneurial skills • Plant biotechnology, concept of plant tissue culture and R-DNA technology and its application. • Validate and document scientific data • Analyze the data scientifically • Apply bioinformatics tools for predicting the functioning of DNA and proteins

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Course Outcome of T.Y.B.Sc. Botany.

Semester-V

Course Code : USBO501
Course Title:- PLANT DIVERSITY – III
Outcome of the Course : After the completion of the course, students will be able to: • To gain knowledge about microbial diversity and techniques for culturing and visualization. • To understand the salient features of three major groups of algae, their life cycle patterns with a suitable example; to be able to identify them. • To learn the general characteristics and classification of two major groups of fungi along with life cycles of each group; to be able to identify them. • To understand the scope and importance of Plant Pathology and apply the concepts of various control measures of commonly widespread plant diseases

Course Code: USBO502
Course Title: PLANT DIVERSITY – IV
Outcome of the Course : After the completion of the course, students will be able to: • To acquire knowledge of different fossil forms and understand their role in evolution. • To provide plant description, describe the morphological and reproductive structures of seven families and also identify and classify according to Bentham and Hooker's system. • To gain proficiency in the use of keys and identification manuals for identifying any unknown plants to species level. • To relate anomalies in internal stem structure with function and appreciate the salient features of the root stem transition zone. • To get exposure to pollen study and learn to apply it in various fields.

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Course Code : USBO503
Course Title: FORM AND FUNCTIONS- II
Outcome of the Course : After the completion of the course, students will be able to: • To acquire knowledge about two important organelles and molecular mechanisms of translation • To understand water relations of plants, inorganic and organic solute transport, and apply the knowledge to manage mineral nutrition and survival in challenging abiotic stresses. • To understand succession in plant communities and study remediation technologies in order to apply knowledge acquired for cleanup of polluted sites. • To get exposure to principles and techniques of plant tissue culture and apply these studies forimproving agriculture and horticulture and to become an entrepreneur.

Course Code: USBO504
Course Title: CURRENT TRENDS IN PLANT SCIENCES – II
Outcome of the Course: After the completion of the course,**The students would be able:** • To get exposure to the technique of mushroom cultivation and explore the possibility of entrepreneurship in the same. • To learn ethnobotanical principles, applications and utilize indigenous plant knowledge for the cure of common human diseases and improvement of agriculture. • To gain knowledge about the latest molecular biology techniques for isolation and characterization of genes. • To learn principles and application of commonly used techniques in instrumentation. • To gain proficiency in the monograph study and pharmacognostic analysis of six medicinal plants.

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Course Outcome of T.Y.B.Sc.Botany.

Semester-VI

Course Code: USBO601
Course Title: PLANT DIVERSITY – III
Outcome of the Course : After the completion of the course, **The students would be able to:** • To identify, describe and study in detail the life cycles of three Bryophytes • To and study in detail classification and general characters of three classes of Pteridophytes and identify as well as describe the life cycles of one example from each class. • To study evolutionary aspects and economic utilization of Bryophytes and Pteridophytes. • To identify, describe and study in detail the life cycles of three Gymnosperms.

Course Code : USBO602
Course Title: PLANT DIVERSITY – IV
Outcome of the Course : After the completion of the course,**students would be able to:** • To study contribution of Botanical gardens, BSI to Angiosperm study and provide plant description, describe the morphological and reproductive structures of seven families. • To gain exposure to a phylognetic system of classification.To gain insight into the anatomical adaptations of different ecological plant groups. • To understand development plant of male and female gametophytes, embryonic structure and development. • To understand the different aspects and importance of Biodiversity and utilize them for conservation of species so as to prevent further loss or extinction of Biodiversity and preserve the existing for future generations.

Course Code: USBO603
Course Title: FORMS AND FUNCTION – III
Outcome of the Course : After the completion of the course,**students would be able to:** • To study various plant biomolecular structures and appreciate the structures, role, functions and applications of enzymes. • To gain insight into the Nitrogen and plant hormone metabolism with applications of the same in agriculture and horticulture. • To understand principles of genetic mapping , mutations and solve problems based on them, gain knowledge of various metabolic disorders and their implications.

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- To generate and test hypotheses, make observations, collect data, analyze and interpret results, derive conclusions, and evaluate their significance within a broad scientific context, using suitable statistical techniques.

Course Code : USBO604

Course Title: - Current Trends in Plant Science – II

Outcome of the Course: After the completion of the course,**students would be able to:**

- To gain insight into recent molecular biology techniques for DNA analysis and amplification and Bar coding techniques and applications therein.
- To understand and apply tools of Bioinformatics for data retrieval and phylogenetic analysis.
- To learn about the sources of economically important plants in the field of fats and oils and apply it for extraction, dealing with entrepreneurship in the field.
- To gain knowledge and proficiency in preservation of post harvest produce and explore the possibility of entrepreneurship in the field.

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Course Code : USACHO501 & USACHO601
Course Title: - HORTICULTURE AND GARDENING
Outcome of the Course: After the completion of the course, **students would be able to:** • Acquire knowledge about the fundamental aspects of horticulture • To know the different techniques in gardening • Promote the cultivation of horticultural plants through various propagation techniques. • To understand the importance green house and its construction • To learn the principles of garden design

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3 years B.Sc. Physics Programme Objectives

- Knowledge of Fundamental Physics: Students will acquire a strong foundation in the principles and theories of classical physics, quantum mechanics, electromagnetism, thermodynamics, and statistical mechanics. They will understand the laws governing thebehavior of matter and energy.
- Mathematical and Computational Skills: Students will develop proficiency in mathematical techniques and computational methods used in physics. They will learn to solve complex problems using mathematical models, perform data analysis, and use computational toolsfor simulations and numerical calculations.
- Laboratory Skills: Students will gain practical experience in conducting experiments, utilizing scientific equipment, and analyzing data. They will learn to design and perform experiments, handle instrumentation, and develop skills in data acquisition, analysis, and interpretation.
- Problem-Solving and Critical Thinking: Students will develop strong analytical and problem-solving skills. They will learn to apply theoretical concepts and mathematical methods to solve physics problems and analyze real-world phenomena. They will also develop critical thinking skills to evaluate and interpret scientific results.

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Course Outcome of F.Y.B.Sc.Physics.

Semester-I

Course Code: USPH101
Course Title: CLASSICAL PHYSICS
Outcome of the Course: On successful completion of this course the student will be able to understand: • Apply Newton's laws for the calculations of the motion of simple systems. • UseWorkandEnergyequivalenceanditsapplicationsthroughsuitablenumerical. • Use Elasticity, Viscosity and Fluid dynamics in daily life. • Understand Real gases and validity of the laws of thermodynamics. • Demonstratequantitativeproblemsolvingskillsinallthetopicscovered

Course Code: USPH102
Course Title: MODERN PHYSICS
Outcome of the Course: On successful completion of this course the student will be able to: • Understand nuclear properties, nuclear behavior and various types of nuclear reactions • 2. Understand the concept of radioactivity, its applications and different types of equilibria in radioactive elements. • Understand various types of nuclear detectors and their applications . • Demonstrate and understand the quantum mechanical concepts. • Demonstratequantitativeproblemsolvingskillsinallthetopicscovered

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Course Outcome of F.Y.B.Sc.Physics..

Semester-II

Course Code: USPH201
Course Title: OPTICS I
Outcome of the Course: On successful completion of this course the student will be able to understand: • Understand the concept of lens, lens defects and their minimization. • Significance of combination of lenses implied to eye piece of optical instrument. • Under set and interference of light with few well-known daily life examples. • Understand Lasers and Optical fibers, their applications in day-today life.

Course Code : USPH202
Course Title : Electricity and Electronics
Outcome of the Course : On successful completion of this course the student will be able to understand: • Understand the basic concepts of Alternating current theory, AC bridges and Circuit Theorems • Understand the basics of Analog and Digital Electronics and apply the mineral life situations • Demonstrate quantitative problem solving skills in all the topics covered

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Course Outcome of S.Y.B.Sc.Physics.

Semester-III

Course Code: USPH301
Course Title: Mechanics and thermodynamics
Outcome of the Course: After the completion of the course, Students will be able to: • Understand the concepts of mechanics & properties of matter & to apply them to problems. • Comprehend the basic concepts of thermodynamics & its applications in physical situation. • Learn about situations in low temperature. • Demonstrate tentative problem solving skills in all above areas.

Course Code: USPH302
Course Title: VECTOR CALCULUS, ANALOG ELECTRONICS
Outcome of the Course : After the completion of the course, Students will be able to: • Understand the basic concepts of mathematical physics and their applications in physical situations. • Understand the basic laws of electrodynamics and be able to perform calculations using them. 3 • Understand the basics of transistor biasing, operational amplifiers, their applications • Understand the basic concepts of oscillators and be able to perform calculations using them. • Demonstrate quantitative problem solving skill in all the topics covered

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Course Code: USPH303
Course Title: APPLIED PHYSICS – I
Outcome of the Course: After the completion of the course, Students will be able to: • Students will be exposed to contextual real life situations. • Students will appreciate the role of Physics in 'interdisciplinary areas related to materials, Bio Physics, Acoustics etc. • The learner will understand the scope of the subject in Industry & Research. • Experimental learning opportunities will faster creative thinking & a spirit of inquiry.

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Course Outcome of S.Y.B.Sc.Physics.

Semester-IV

Course Code : USPH401
Course Title : Optics and Digital Electronics
Outcome of the Course : After the completion of the course, Students will be able to: • Understand the diffraction and polarization processes and applications of them in physical situations. • Understand the applications of interference in design and working of interferometers. • Understand the resolving power of different optical instruments. • Understand the working of digital circuits • Use IC 555 time for various timing applications. • Demonstrate quantitative problem solving skills in all the topics covered.

Course Code : USPH402
Course Title:- QUANTUM PHYSICS
Outcome of the Course : After the completion of the course, Students will be able to: • Understand the postulates of quantum mechanics and to understand its importance in explaining significant phenomena in Physics. • Demonstrate quantitative problem solving skills in all the topics covered.

Course Code:USPH 403
Course Title: APPLIED PHYSICS II
Outcome of the Course: After the completion of the course, Students will be able to: • Understand the concepts of mechanics & properties of matter & to apply them to problems. • Comprehend the basic concepts of thermodynamics & its applications in physical situation. • Learn about situations in low temperature. • Demonstrate tentative problem solving skills in all above areas.

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Course Outcome of T.Y.B.Sc.Physics.

Semester-V

Course Code : USPH501
Course Title:- Mathematical, Thermal and Statistical Physics
Outcome of the Course : After the completion of the course, Students will be able to: • From this course, the students are expected to learn some mathematical techniques required to understand the physical phenomena at the undergraduate level and get exposure to important ideas of statistical mechanics. • The students are expected to be able to solve simple problems in probability, understand the concept of independent events and work with standard continuous distributions. T • he students will have idea of the functions of complex variables; solve nonhomogeneous differential equations and partial differential equations using simple methods. • The units on statistical mechanics would introduce the students to the concept of microstates, Boltzmann distribution and statistical origins of entropy. • It is also expected that the student will understand the difference between different statistics, classical as well as quantum.

Course Code: USPH502
Course Title: : SOLID STATE PHYSICS
Outcome of the Course : After the completion of the course, Students will be able to: • Understand the basics of crystallography, Electrical properties of metals, Band Theory of solids, demarcation among the types of materials, Semiconductor Physics and Superconductivity. • Understand the basic concepts of Fermi probability distribution function, Density of states, conduction in semiconductors and BCS theory of superconductivity. • Demonstrate quantitative problem solving skills in all the topics covered.

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Course Code : USPH503
Course Title: Atomic and Molecular Physics
Outcome of the Course : After the completion of the course, Students will be able to: • Understand the application of quantum mechanics in atomic physics the importance of electron spin, symmetric and antisymmetric wave functions and vector atom model Effect of magnetic
field on atoms and its application Learn Molecular physics and its applications. This course will be useful to get an insight into spectroscopy..

Course Code: USPH504
Course Title: Electrodynamics
Outcome of the Course: After the completion of the course,**The students would be able:** • Understand the laws of electrodynamics and be able to perform calculations using them. • Understand Maxwell's electrodynamics and its relation to relativity • Understand how optical laws can be derived from electromagnetic principles. • Develop quantitative problem solving skills.

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Course Outcome of T.Y.B.Sc.Physics.

Semester-VI

Course Code: USPH601
Course Title: Classical Mechanics
Outcome of the Course : After the completion of the course, **The students would be able to:** • This course will introduce the students to different aspects of classical mechanics. • They would understand the kinds of motions that can occur under a central potential and their applications to planetary orbits. • The students should also appreciate the effect of moving coordinate system, rectilinear as well as rotating. The students are expected to learn the concepts needed for the important formalism of Lagrange's equations and derive the equations using D'Alembert's principle. They should also be able to solve simple examples using this formalism. • The introduction to simple concepts from fluid mechanics and understanding of the dynamics of rigid bodies is also expected. • Finally, they should appreciate the drastic effect of adding nonlinear corrections to usual problems of mechanics and nonlinear mechanics can help understand the irregularity we observe around us in nature..

Course Code : USPH602
Course Title: Electronics
Outcome of the Course : After the completion of the course, **The students would be able to:** • Understand the basics of semiconductor devices and their applications. • Understand the basic concepts of operational amplifier: its prototype and applications as instrumentation amplifier, active filters, comparators and waveform generation. • Understand the basic concepts of timing pulse generation and regulated power supplies • Understand the basic electronic circuits for universal logic building blocks and basic concepts of digital communication. • Develop quantitative problem solving skills in all the topics covered.

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Course Code: USPH603
Course Title: Nuclear Physics

Outcome of the Course : After the completion of the course, **The students would be able to:**

- Upon successful completion of this course, the student will be able to Understand the fundamental principles and concepts governing classical nuclear and particle physics and have a knowledge of their applications interactions of ionizing radiation with matter the key techniques for particle accelerators the physical processes involved in nuclear power generation.
- Knowledge on elementary particles will help students to understand the fundamental constituents of matter and lay foundation for the understanding of unsolved questions about dark matter, antimatter and other research oriented topics.

Course Code : USPH604
Course Title: - Special Theory of Relativity

Outcome of the Course: After the completion of the course, **The students would be able to:**

- Understand the significance of Michelson Morley experiment and failure of the existing theories to explain the null result
- Understand the importance of postulates of special relativity, Lorentz transformation equations and how it changed the way we look at space and time, Absolutism and relativity, Common sense versus Einstein concept of Space and time.
- Understand the transformation equations for: Space and time, velocity, frequency, mass, momentum, force, Energy, Charge and current density, electric and magnetic fields.
- Solve problems based on length contraction, time dilation, velocity addition, Doppler effect, mass energy relation and resolve paradoxes in relativity like twin paradox etc.

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Course Code: USACEI501 & USAEI601
Course Title: Electronic Instrumentation
Outcome of the Course: After the completion of the course,**The students would be able:** • Understand the difference between a transducer and a sensor. • Understand the construction, working and uses of different types of transducers. • Understand the concept of signal conditioning, devices used and their operations. • Get acquainted with the measuring instruments used in laboratory. • Get the insight of the modern medical instruments in principle, which are used in day to day life. • Analyze/design and implement combinational logic circuits. • Develop assembly language programing skills and real time applications of microprocessor. • Illustrate how to interface the I/O peripheral (PPI) with 8085 microprocessor • Understand architecture, silent features, instruction set, programming and interfacing of 8051 microcontroller. • Develop the programming skills in programming Language C++. • Train their practical knowledge through lab experiments. • Get practical training to interface different programmable peripherals and I/O devices to microprocessor and microcontroller.

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3 year B.Sc. Zoology Programme Objectives

- To nurture interest in the students for the subject of Zoology
- To create awareness of the basic and modern concepts of Zoology
- To orient students about the importance of abiotic and biotic factors of environment and their conservation.
- To provide an insight to the basic nutritional and health aspects of human life.
- To inculcate good laboratory practices in students and to train them about scientific handling of important instruments.

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Course Outcome of F.Y.B.Sc. ZOOLOGY.

Semester-I

Course Code : USZO101 (Course 1)
Course Title : Wonders of Animal World, Biodiversity and its Conservation
Outcome of the Course : After completing this course students will be able to : • Curiosity will be ignited in the mind of learners, to know more about the fascinating world of animals which would enhance their interest and love for the subject of Zoology. • Learners would appreciate treasure of Biodiversity, its importance and hence would contribute their best for its conservation. • Minds of learners would be impulse to think differently and would be encouraged ipso facto to their original crude ideas from the field of biological sciences.

Course Code : USZO102 (Course 2)
Course Title : INSTRUMENTATION and ANIMAL BIOTECHNOLOGY
Outcome of the Course : After completing this course students will be able to: • Learners would work safely in the laboratory and avoid occurrence of accidents (mishaps) which will boost their scholastic performance and economy in use of materials/chemicals during practical sessions. • Learners would understand recent advances in the subject and their applications for the betterment of mankind; and that the young minds would be tuned to think out of the box. • Students will be skilled to select and operate suitable instruments for the studies of different components of Zoology of this course and also of higher classes including research.

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Course Outcome of F.Y.B.Sc. ZOOLOGY.

Semester-II

Course Code : USZO201 (Course: 3)
Course Title : Ecology and Wildlife Management
Outcome of the Course : After completing this course students will be able to: • This unit would allow learners to study about nature of animal population, specific factors affecting its growth and its impact on the population of other life form. • Learners will grasp the concept of interdependence and interaction of physical, chemical and biological factors in the environment and will lead to better understanding about implications of loss of fauna specifically on human being, erupting spur of desire for conservation of all flora and fauna. • Learners would be inspired to choose career options in the field of wild life conservation, research, photography and ecotourism.

Course Code:[USZO 202]
Course Title:: NUTRITION, PUBLIC HEALTH AND HYGIENE
Outcome of the Course : After completing this course students will be able to: • Healthy dietary habits would be inculcated in the life style of learners in order to prevent risk of developing health hazards in younger generation due to faulty eating habits. • Promoting optimum conservation of water, encouragement for maintaining adequate personal hygiene, optimum use of electronic gadgets, avoiding addiction, thus facilitating achievement of the goal of healthy young India in true sense. • Learners will be able to promptly recognize stress related problems at initial stages and would be able to adopt relevant solutions which would lead to psychologically strong mind set promoting positive attitude important for academics and would be able to acquire knowledge of cause, symptoms and precautions of infectious diseases.

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Course Outcome of S.Y.B.Sc. ZOOLOGY.

Semester-III

Course Code : USZO301 (Course-V)
Course Title : Fundamentals of Genetics, Chromosomes and Heredity, Nucleic acids
Outcome of the Course : After completing this course students will be able to: • Learner would comprehend and apply the principles of inheritance to study heredity. • Learner will understand the concept of multiple alleles, linkage and crossing over • To familiarize the learners with the structure, types and classification of chromosomes. • To introduce the concept of sex determination and its types, sex influenced and sex-limited genes • To introduce the learner to the classical experiments proving DNA as the genetic material. • To introduce the learner the structure of nucleic acids and the concept of central dogma of molecular biology. • To familiarize the learner with the concept of gene expression and regulation

Course Code : USZO302 (COURSE-VI)
Course Title : Nutrition and Excretion, Respiration and Circulation, Control and Coordination of Life Processes, Locomotion and Reproduction
Outcome of the Course:: After completing this course students will be able to : • Learner would understand the increasing complexity of nutritional, excretory and osmoregulatory physiology in evolutionary hierarchy. • Learner would be able to correlate the habit and habitat with nutritional, excretory and osmoregulatory structures. • Learner would understand the increasing complexity of respiratory and circulatory physiology in evolutionary hierarchy. • Learner will be able to correlate the habit and habitat of animals with respiratory and circulatory organs. • Learner would understand the process of control and coordination by nervous and endocrine regulation. • Learner would be amazed by various locomotory structures found in the animal kingdom. • Learner would be acquainted with various reproductive strategies present in animals.

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Course Code : USZOE1303 (COURSE-VIIA) ELECTIVE 1
Course Title : Ethology, Parasitology, Economic Zoology
Outcome of the Course : After completing this course students will be able to: • Learner would gain insight into different types of animal behaviour and their role in biological adaptations .Learner would be sensitized to the feelings which are instrumental in social behavior • Learner would understand the general epidemiological aspects of parasites that affect humans and take simple preventive measures for the same. • Learner would comprehend the life cycle of specific parasites, the symptoms of the disease and its treatment. • Learner would gain knowledge on animals useful to mankind and the means to make the most of it & Learner would learn the modern techniques in animal husbandry. Learner would pursue entrepreneurship as a career

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Course Outcome of S.Y.B.Sc. ZOOLOGY.

Semester-IV

Course Code : USZO401 (COURSE-VIII)
Course Title : Origin and Evolution of Life, Population Genetics and Evolution, Scientific Attitude, Methodology, Scientific Writing and Ethics in Scientific Research
Outcome of the Course : After completing this course students will be able to: • Learner will gain insights into the origin of life. • Learner will analyse and critically view the different theories of evolution. • Learner would understand the forces that cause evolutionary changes in natural populations • Learner would comprehend the mechanisms of speciation • Learner will be able to distinguish between microevolution, macroevolution and mega evolution • The learner would develop qualities such as critical thinking and analysis • • The learner will imbibe the skills of scientific communication and he/she will understand the ethical aspects of research

Course Code : USZO402 (Course - IX)
Course Title : Cell Biology, End membrane System, Bimolecular
Outcome of the Course:: After completing this course students will be able to : • Learner would acquire insight into the composition of the transport mechanisms adopted by the cell and its organelles for its maintenance and composition of cell • Learner would appreciate the intricacy of endomembrane system. • Learner would understand the interlinking of endomembrane system for functioning of cell • The learner will realize the importance of biomolecules and their clinical significance.

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CourseCode:USZOE1303 (COURSE-VIIA) ELECTIVE 1
Course Title : Comparative Embryology, Aspects of Human Reproduction, Pollution and its effect on organism
Outcome of the Course : After completing this course students will be able to: • Learner will be able to understand and compare the different types of eggs and sperms • Learner will be able to understand and compare the different pre- embryonic stages • Learners will able to understand human reproductive physiology • Learners will become familiar with advances in ART and related ethical issues. • The learners will be sensitized about the adverse effects of pollution and measures to control it.

Course Code:USZOE2403 (Course-XB) Elective 2
Course Title : Dairy Industry, Sericulture and Aquaculture
Outcome of the Course : After completing this course students will be able to: • Learner would gain knowledge on the functioning of various aspects of dairy industry, indigenous, exotic cattle and buffalo breeds in India. • Learner will study different systems of breeding and gain information regarding various aspects pertaining to housing of dairy animals. • Learner would understand the basics of the functioning of sericulture industry and its scope in India. • Learner shall gain knowledge on the varieties of silkworms, host-plants and aspects on silk extraction and the diseases afflicting silk-worms. • Learner shall understand the aquaculture practices and the scope of fishery in India. • Learner would gain knowledge of various techniques employed in aquaculture practices.

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Course Outcome of T.Y.B.Sc. ZOOLOGY.

Semester-V

Course Code:USZO501
Course Title : Invertebrates and Type Study
Outcome of the Course : After completing this course students will be able to: • Learners will apprehend the basis of classification and modern classification up to class of the lower invertebrate animals. • The learners will be familiarized with classification up to phylum Nematoda along with their examples. • Learners will get an idea of higher groups of invertebrate animal life, their classification and their peculiar aspects. • Learners will get an idea of general characteristics and details of invertebrate animal systems.

Course Code: USZO502
Course Title:: Hematology and Immunology
Outcome of the Course: After completing this course students will be able to : • The learner shall comprehend basic hematology. • The learner will be able to identify various components of haemostatic systems. • The learner will be familiar with the terminology used and diagnostic tests performed in a pathological laboratory. • The learner shall be acquainted with diagnostic approaches in haematological disorders. • The learner will be better equipped for further pathological course or working in a diagnostic laboratory • The learner shall comprehend the types of immunity and the components of immune system. • The learner will realize the significant role of immune system in giving resistance against diseases. • The learner shall understand immunopathology and the principles and applications of vaccines. • The learner will develop basic understanding of immunology of organ transplantation.

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Course Code:USZO503
Course Title : Histology, Toxicology, Pathology and Biostatistics
Outcome of the Course : After completing this course students will be able to: • Learner would appreciate the well planned organization of tissues and cells in the organ systems. • The course will prepare learner to develop broad understanding of the different areas of toxicology. • It will also develop critical thinking and assist students in preparation for employment in pharmaceutical industry and related areas. • Learner will be familiar with various medical terminology pertaining to pathological condition of the body caused due to diseases. • The learner will be able to collect, organize and analyse data using parametric and nonparametric tests. They will also be able to set up a hypothesis and verify the same using limits of significance.

Course Code:USZO504
Course Title : Anatomy and Developmental Biology
Outcome of the Course : After completing this course students will be able to: • Learner will be able to understand the importance of various types of epidermal and dermal derivatives along with their functions. • Learner will be able to understand the processes involved in embryonic development and practical applications of studying the chick embryology

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Semester V: Applied Environmental Sciences

Course Code:USACEVS501
Course Title:: Applied Environmental Sciences
Outcome of the Course : After completing this course students will be able to: • Learner shall comprehend the impact of the interrelationship between various components of environment. • Learner will apply the knowledge of pollutants to undertake research projects/studies. • Learner would be critical and creative during the designing, manufacturing and utilization of chemical products, which would reduce or eliminate the use or generation of hazardous substances. • Learner shall value the alternative energy resources and hence follow the 4 R's (Reduce, Reuse, Recycle & Reinvent). • Learner may discover and design products, operations or processes, which conserve the energy resources. • Learner shall develop skills in instrumentation used for the study and analysis of various substances related to the environment. • Learner and facilitator both will develop conceptual clarity on pollution control and green environmental auditing, besides gaining knowledge about these programmes in the Indian scenario. • Learner and facilitator both will be exposed to the various areas and facets of industrial consultancy, and shall also develop competency and confidence to explore it. • Learner will be able to grasp the importance of various norms required for MPCB permits and procedure for liaison • Learner will develop an acumen to tap the potential for entrepreneurship with respect to environment related products and indoor plants. • Learner will comprehend and develop better acumen so as to, take wise and necessary decisions while participating in environment related projects or framing policies/assessing environmental damages/carrying out entrepreneurial activities beneficial to environment. • Learner shall primarily learn to tackle real life situations with common sense.

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Course Outcome of T.Y.B.Sc. ZOOLOGY.

Semester-VI

Course Code:USZO601
Course Title : Taxonomy - Chordates and Type Study
Outcome of the Course : After completing this course students will be able to: • Learners will get an idea of origin of Chordates, its taxonomy up to class with reference to phylogeny and their special features. • Learners will understand the characteristic features and examples of class of Reptilia, Aves and Mammalia. • Learners will get an idea of vertebrate animal life after studying one representative animal – shark

Course Code:USZO602
Course Title: Physiology and Tissue Culture
Outcome of the Course:: After completing this course students will be able to : • The learner shall understand fundamentals of enzyme structure, action and kinetics. The learner shall appreciate the enzyme assay procedures and the therapeutic applications of enzymes. • The learner shall comprehend the adaptive responses of animals to environmental changes for their survival. • The learner shall understand the types and secretions of endocrine glands and their functions. • The learner shall understand the significance of tissue culture as a tool in specialized areas of research. • The learner will appreciate its applications in various industries.

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Course Code:USZO603
Course Title : Genetics and Bioinformatics
Outcome of the Course : After completing this course students will be able to: • Learner shall get an insight into the intricacies of chemical and molecular processes that affect genetic material. • The course shall prepare learner to recognize the significance of molecular biology as a basis for the study of other areas of biology and biochemistry. • Learner shall also understand related areas in relatively new fields of genetic engineering and biotechnology. • The learner shall get acquainted with the vast array of techniques used to manipulate genes which can be applied in numerous fields like medicine, research, etc. for human benefit. • The learner shall become aware of the impact of changes occurring at gene level on human health and its diagnosis. • Learner shall become aware of the computational point of view of studying the genomes

Course Code:USZO604
Course Title : Environmental Biology and Zoopharmacognosy
Outcome of the Course : After completing this course students will be able to: • Learner will understand the different factors affecting environment, its impact and environment management laws. • Learner will be able to understand various methods for wildlife conservation. • Learner will be able to apply knowledge to overcome the issues related to wildlife conservation and management. • Learner will understand the paradigms of discovery and commercialization of biological resources and knowledge gained from self-medication observed in animals. • The learners will become acquainted with how and why different animal species are distributed around the globe

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Semester VI Environmental Management

Course Code:USACEVS601
Course Title: Environmental Management
Outcome of the Course : After completing this course students will be able to: • Learner will gain knowledge about environmental testing and monitoring laboratories, air, water quality and noise exposure standards and methods of physico-chemical and bacteriological sampling. • Learner will be exposed to the know-how regarding establishing environmental testing and monitoring laboratories. • Learner will study and comprehend the treatment practices applied for domestic waste water and industrial effluents. • Learner will be equipped with the knowledge of some alternatives to conventional resources. • Learner will develop an understanding on the concept, application and limitation of modelling as a tool for summarising or applying the research and survey findings. • Learner will develop skills on the application of neural networking and statistical modelling. • Learner will gain an insight into the basics of costing, book keeping and accountancy. • Learner will be equipped to apply the concepts in his entrepreneurial ventures. Learner will develop aptitude to examine and assess the outcome of the framework of current biodiversity hotspots and biosphere reserves. • Learner will be able to list the different aspects of wildlife photography and inspect the positive and negative aspects of it, also be able to recommend how wildlife photography can support biodiversity conservation. • Learner will be able to assess the future challenges that ecotourism can generate for biodiversity conservation. • Learner will ponder upon and find out the what, why, where, whom and which of climate change and global warming. • Learner will be able to identify and evaluate the effects of the different sources of greenhouse substances. • Learner will imbibe positive changes in attitudes, commitments and civic actions required to combat harmful effects of anthropogenic activities and development on environment. • Learner would inculcate ethical values and responsibilities towards protection of environment. • Learner will be equipped to implement goals of environment protection.

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3 year B.Sc. Mathematics Programme Objectives

(i) Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerous power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.

(ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.

(iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.

(iv) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences

. (v) Compute a generating function and apply them to combinatorial problems.Computer programming is one of the most important aspects of modern life. It allows us to interact with computers in ways that were not possible before. It has enabled us to conduct research, design new products, and services, manage our finances, communicate with others around the World,and much more.

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Course Outcome of F.Y.B.Sc. Mathematics.

Semester-I

Course Code:USMT 101
Course Title: Calculus I
Outcome of the Course: Upon successful completion of this course the student will be able to understand: • This course gives introduction to basic concepts of Analysis with rigor and prepares students to study further courses in Analysis. • Formal proofs are given lot of emphasis in this course which also enhances understanding of the subject of Mathematics as a whole. • .The portion on first order, first degree differentials prepares learner to get solutions of so many kinds of problems in all subjects of Science and also prepares learner for further studies of differential equations and related fields. Students should be able to analyse convergence of any sequence. • Students will know the application of sequences • Students are able to sketch graphs of real valued functions using calculus 6. Students shall be able to use concept of continuity in real world problems

Course Code:USMT 102
Course Title: Algebra
Outcome of the Course: Upon successful completion of this course the student will be able to understand: • This course gives expositions to number systems (Natural Numbers & Integers), like divisibility and prime numbers and 4 their properties. • These topics later find use in advanced subjects like cryptography and its uses in cyber security and such related fields

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Course Outcome of S.Y.B.Sc.Mathematics.

Semester-II

Course Code:USMT 201
Course Title: Calculus II
Outcome of the Course: Upon successful completion of this course the student will be able to understand: • This course gives introduction to basic concepts of Analysis with rigor and prepares students to study further courses in Analysis. • Formal proofs are given lot of emphasis in this course which also enhances understanding of the subject of Mathematics as a whole. • .The portion on first order, first degree differentials prepares learner to get solutions of so many kinds of problems in all subjects of Science and also prepares learner for further studies of differential equations and related fields. Students should be able to analyse convergence of any sequence. • Students will know the application of sequences • Students are able to sketch graphs of real valued functions using calculus 6. Students shall be able to use concept of continuity in real world problems

Course Code :USMT 202
Course Title : Discrete Mathematics
Outcome of the Course : Upon successful completion of this course the student will be able to understand: • Mathematical Reasoning: Students will be able to understand mathematical reasoning in order to read, comprehend, and construct mathematical arguments which serves as the foundation for the subsequent discussions of methods of proof. • Combinatorial Analysis: The learners will possess the ability to count or enumerate objects which begins with the basic techniques of counting. They will be able to perform combinatorial analysis to solve counting problems and analyze algorithms, not on applying formulae. • Discrete Structures: Students can work with discrete structures, which are the abstract mathematical structures used to represent discrete objects and relationships between these objects. • To relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context. To use Graph Theory for solving problems

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Course Outcome of S.Y.B.Sc.Mathematics.

Semester-III

Course Code:USMT 301
Course Title: Calculus III
Outcome of the Course: Upon successful completion of this course the student will be able to understand: • limit and continuity of functions of several variables • fundamental concepts of multivariable Calculus. • series expansion of functions. • extreme points of function and their maximum, minimum values at those points. • meaning of definite integral as limit as sums. • how to solve double and triple integration and use them to find area by double integration and volume by triple integration.

Course Code:USMT 302
Course Title: Linear Algebra I
Outcome of the Course : After the completion of the course, Students will be able to: • Identify and construct linear transformations of a matrix. • Characterize linear transformations as onto, one-to-one. • Solve linear systems represented as linear transforms. • Express linear transforms in other forms, such as as matrix equations, and vector equations. • Characterize a set of vectors and linear systems using the concept of linear independence. • Learn to find rank and nullity of a linear transformation. • Learn the existence and uniqueness of system Ax=b using determinant and its applications. • Learn to find corresponding orthogonal/orthonormal set from a linearly independent set in a vector space.

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Course Code:USMT 303
Course Title:ORDINARY DIFFERENTIAL EQUATIONS
Outcome of the Course: After the completion of the course, Students will be able to: • Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous. • Student will be able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution. • Student will be introduced to the complete solution of a nonhomogeneous differential equation with constant coefficients by the method of undetermined coefficients. • Student will be able to find the complete solution of a differential equation with constant coefficients by variation of parameters. • Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficient.

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Course Outcome of S.Y.B.Sc.Mathematics.

Semester-IV

Course Code :USMT 401
Course Title : Multivariable Calculus I
Outcome of the Course : After the completion of the course, Students will be able to: • This course gives introduction to basic concepts of Analysis with rigor and prepares students to study further courses in Analysis. • Formal proofs are given lot of emphasis in this course which also enhances understanding of the subject of Mathematics as a whole. • The portion on first order, first degree differentials prepares learner to get solutions of so many kinds of problems in all subjects of Science and also prepares learner for further studies of differential equations and related fields. And To know actual definition of integration ,Relations between derivative and integral , Study of improper integrals and their applications ,double, integrals and their applications triple

Course Code : USMT 402
Course Title:- Linear Algebra II
Outcome of the Course : After the completion of the course, Students will be able to: • Identify and construct linear transformations of a matrix. • Characterize linear transformations as onto, one-to-one. • Solve linear systems represented as linear transforms. • Express linear transforms in other forms, such as as matrix equations, and vector equations. • Characterize a set of vectors and linear systems using the concept of linear independence. • Learn to find rank and nullity of a linear transformation.
CourseCode:USMT 403
CourseTitle:- Numerical Methods
Outcomeof theCourse: After the completion of the course, Students will be able to: • Solve an algebraic or transcendental equation using an appropriate numerical method. • Solve a linear system of equations using an appropriate numerical method. • Perform an error analysis for a given numerical method. • Learn the existence and uniqueness of system Ax=b using determinant and its applications. • Learn to find corresponding orthogonal/orthonormal set from a linearly independent set in a vector space.

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Course Outcome of T.Y.B.Sc.Mathematics.

Semester-V

Course Code : USMT 501
Course Title:- Multivariable Calculus II
Outcome of the Course : After the completion of the course, Students will be able to: • In this course students will learn the basic ideas, tools and techniques of integral calculus and use them to solve problems from real-life applications including science and engineering problems involving areas, volumes, centroid, Moments of mass and center of mass Moments of inertia. Examine vector fields and define and evaluate line integrals using the Fundamental Theorem of Line Integrals and Green's Theorem; compute arc length.

Course Code:USMT 502
Course Title: Group Theory
Outcome of the Course : After the completion of the course, Students will be able to: • Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element, rings, Euclidean domain, Principal ideal domain and Unique factorization domain. Students will also understand the connection and transition between previously studied mathematics and more advanced mathematics. The students will actively participate in the transition of important concepts such homomorphisms & isomorphisms from discrete mathematics to advanced abstract mathematics.

Course Code:USMT 503
Course Title: -Topology of metric spaces
Outcome of the Course : After the completion of the course, Students will be able to: • This course introduces students to the idea of metric spaces. It extends the ideas of open sets, closed sets and continuity to the more general setting of metric spaces along with concepts such as compactness and connectedness. Convergence concepts of sequences and series of functions, power series are also dealt with. Formal proofs are given a lot of emphasis in this course. This course serves as a foundation to advanced courses in analysis. Apart from understanding the concepts introduced, the treatment of this course will enable the learner to develop reasoning about analysis with clarity and rigour.

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Course Code:USMT 504
Course Title: -Graph Theory
Outcome of the Course: Upon successful completion of Graph Theory course, a student will be able to: • Demonstrate the knowledge of fundamental concepts in graph theory, including properties and characterization of graphs and trees. • Describe knowledgeably special classes of graphs that arise frequently in graph theory. • Describe the concept of isomorphic graphs and isomorphism invariant properties of graphs. • Describe and apply the relationship between the properties of a matrix representation of a graph and the structure of the underlying graph. • Demonstrate different types of algorithms including Dijkstra's, BFS, DFS, MST and Huffman coding. • Understand the concept of Eulerian graphs and Hamiltonian graphs • Describe real-world applications of graph theory.

MATHEMATICS APPLIED COMPONENT

Course Code:USACCA501
Course Title: -Computer Program and System Analysis
Outcome of the Course: • Will induce programming capabilities in students. • Understand model, components of computer and how it works. • Analyse a problem, and identify and define the computing requirements appropriate to itssolution. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. • Function effectively on teams to accomplish a common goal. An understanding of professional, ethical, legal, security and social issues and responsibilities. An ability to communicate effectively with a wide range of audiences. • Use current techniques, skills, and tools necessary for computing practice. • Apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices. • Apply design and development principles in the construction of software systems of varying complexity.

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Course Outcome of T.Y.B.Sc.Mathematics.

Semester-VI

Course Code:USMT 601
Course Title: -Complex Analysis
• **Outcome of the Course :** Students Analyze sequences and series of analytic functions and types of convergence, Students will also be able to evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula, they will also be able to represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.

Course Code :USMT 602
Course Title: Ring Theory
• **Outcome of the Course :** Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element, rings, Euclidean domain, Principal ideal domain and Unique factorization domain. • Students will also understand the connection and transition between previously studied mathematics and more advanced mathematics. • The students will actively participate in the transition of important concepts such homomorphisms & isomorphisms from discrete mathematics to advanced abstract mathematics.

Course Code:USMT 603
Course Title: Topology of metric spaces and real analysis
Outcome of the Course : This course introduces students to the idea of metric spaces. • It extends the ideas of open sets, closed sets and continuity to the more general setting of metric spaces along with concepts such as compactness and connectedness. • Convergence concepts of sequences and series of functions, power series are also dealt with. Formal proofs are given a lot of emphasis in this course. • This course serves as a foundation to advanced courses in analysis. • Apart from understanding the concepts introduced, the treatment of this course will enable the learner to explain their reasoning about analysis with clarity and rigour.

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Course Code :USMT 604
Course Title: -Graph Theory and Combinatorics
Outcome of the Course: • Understand and apply the basic concepts of graph theory, including colouring of graph, to find chromatic number and chromatic polynomials for graphs • Understand the concept of vertex connectivity, edge connectivity in graphs and Whitney's theorem on 2-vertex connected graphs. • Derive some properties of planarity and Euler's formula, develop the understanding of Geometric duals in Planar Graphs. • Know the applications of graph theory to network flows theory. • Understand different applications of system of distinct representative and matching theory. • Use permutations and combinations to solve counting problems with sets and multisets. • Set up and solve a linear recurrence relation and apply the inclusion/exclusion principle. • Compute a generating function and apply them to combinatorial problems.

MATHEMATICS APPLIED COMPONENT

Course Code:USACCA602
Course Title: - Computer Program and System Analysis
Outcome of the Course: • Will induce programming capabilities in students. • Understand model, components of computer and how it works. • Analyse a problem, and identify and define the computing requirements appropriate to itssolution. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. • Function effectively on teams to accomplish a common goal. An understanding of professional, ethical, legal, security and social issues and responsibilities. An ability to communicate effectively with a wide range of audiences. • Use current techniques, skills, and tools necessary for computing practice. • Apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices. • Apply design and development principles in the construction of software systems of varying complexity.

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3 year B.Sc. Chemistry Programme Objectives

- In Physical Chemistry students should be well acquainted with the fundamental topics in physical chemistry, such as thermodynamics, kinetics, catalysis, structure and bonding, phenomena at the atomic, subatomic and the molecular level.
- In the realm of Inorganic Chemistry student should gain the knowledge ofthe chemistry of the elements and their compounds, the methods of obtaining them, large scale manufacture of bulk and fine chemicals. The preparation and the properties of special materials synthesized and the chemistry of the complexes and their utility in different fields.
- In chemistry of organic compounds, the student must understand the routes of synthesis of different types of materials and their characteristics. They

also gain knowledge of biomolecules, polymers, spectroscopic technique, stereochemistry. Student should know the synthesis; both on the laboratory scale and the manufacture of the same and the parameters involved in the large scale of preparation.

- The student should get introduced to the techniques used in analytical chemistry such as optical, electroanalytical, separation methods, radioanalytical and miscellaneous methods including the classical methods ofanalysis.
- The skills acquired in the practical component of the three-year course will include the use of methods of identification, separation, characterization and estimation of the components present. Student will be able to decide the techniques to be adopted depending on the organic or inorganic origin of thematerial.

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Course Outcome of B.Sc. Chemistry.

Semester-I

Course Code:USCH101
Course Title: General Chemistry Paper 1
Outcome of the Course: After completing this course student will be able to: • Understand the basic principles and concepts of chemical thermodynamics. This includes topics such as energy, heat, work, entropy, enthalpy, and Gibbs free energy. • They will develop strong mathematical and problem-solving skills in chemistry, enabling them to perform accurate and precise calculations and apply their knowledge in various areas of chemistry and related fields. • Gain a comprehensive understanding of the historical development of the atomic model and the contributions of scientists such as Thomson, Rutherford, Bohr, and others. They should comprehend the basic structure of atoms, including the nucleus, electrons, protons and neutrons. • Understand the structure and organization of the periodic table. This includes knowledge of periods (rows) and groups (columns), as well as the significance of the periodic law and its implications for the arrangement of elements. • Understand the basics of organic chemistry, enabling them to understand the structure and reactivity of organic compounds, predict and interpret organic reactions, and apply their knowledge in various fields such as pharmaceuticals, materials science, and chemical research.

Course Code:USCH 102
Course Title: General Chemistry Paper 2
Outcome of the Course: After completing this course student will be able to: • Understand study of reaction rates, rate laws, and factors that influence the rate of chemical reactions. They should learn about the rate equation, rate constant, reaction orders, and how to determine the rate law from experimental data. • Understand concepts such as intermolecular forces, cohesion, adhesion, viscosity, surface tension, and capillary action. Students will also learn about phase diagrams and the relationships between temperature, pressure, and the states of matter. • Periodic trends exhibited by the main group elements (Group 1 &2) on the periodic table. This includes trends in atomic size, ionization energy, electron affinity, electronegativity, and metallic character. Students should be able to analyze and interpret these trends and understand how they influence the chemical behavior of the elements. • Understand the three-dimensional molecular structures and their significance in chemistry. This includes knowledge of stereoisomerism, chirality, and the spatial arrangement of atoms in molecules.

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Course Outcome of B.Sc. Chemistry.

Semester-II

Course Code:USCH201
Course Title: General Chemistry Paper 1
Outcome of the Course: After completing this course student will be able to: • know the properties and behavior of gases. This includes the gas laws (Boyle's law, Charles's law,Avogadro's law, and the ideal gas law), the kinetic theory of gases, and the concept of partial pressure. Students should also learn about real gases and deviations from ideal behavior. • Know principles and applications of electrochemistry. This includes understanding the concept of redox reactions, balancing redox equations, and calculating standard electrode potentials. Students should also gain knowledge about electrochemical cells, electrolysis, and the relationshipbetween cell potential and Gibbs free energy. • Know chemical equilibria and the factors that influence the equilibrium position. This includes theconcept of dynamic equilibrium, Le Chatelier's principle, and the calculation of equilibrium constants. Students should also learn about the relationship between equilibrium constants and thermodynamic parameters. • understand qualitative analysis, which involves the identification of elements and compounds in a given sample based on their chemical properties and reactions. They should learn the principles and techniques used in qualitative analysis. • Know the meaning aliphatic hydrocarbons, which include saturated and unsaturated hydrocarbons. They should learn about the different types of alkanes, alkenes, and alkynes, theirnomenclature, physical properties, and structural characteristics.

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Course Code:USCH 202
Course Title: General Chemistry Paper 2
Outcome of the Course: After completing this course student will be able to: • Understand ionic equilibria, which involves the study of the behavior of ions in solution and the calculation of equilibrium concentrations. They should learn about acid-base equilibria, complex formation equilibria, solubility product equilibria, and the common ion effect. Students should be able to apply equilibrium concepts and mathematical calculations to solve problems related to ionic equilibria. • Learn principles and applications of photochemistry, which involves the study of chemical reactions initiated or influenced by light. They should understand the concepts of electronic excitation, absorption, emission, and the role of excited states in photochemical reactions. • understand the molecular spectroscopy, which involves the study of the interaction of molecules with electromagnetic radiation. They will learn spectroscopic techniques, including UV-Vis spectroscopy, infrared (IR) spectroscopy, and nuclear magnetic resonance (NMR) spectroscopy. • Know factors that influence chemical reactivity, including bond polarity, electronegativity differences, and the presence of functional groups. Students should be able to predict and explain the reactivity of different compounds in various chemical reactions. They will know about Oxidation and reduction processes, the concept of oxidation numbers, and how to balance redox equations. • understand the three-dimensional molecular structures and their significance in chemistry. This includes knowledge of stereoisomerism, chirality, and the spatial arrangement of atoms in molecules. • Understand what are electrophilic aromatic substitution (EAS) reactions. They will understand the mechanisms and conditions under which these reactions occur, such as nitration, halogenation, sulfonation, Friedel-Crafts reactions, and other functional group substitutions. Students should be able to predict the major products and propose reaction mechanisms for aromatic substitution reactions.

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Course Outcome of B.Sc. Chemistry.

Semester-III

Course Code:USCH301
Course Title: General Chemistry Paper 1
Outcome of the Course: Aftercompletingthiscoursestudentwill beableto: • Thoroughly understand the Significance of Gibbs' and Helmholtz Free Energy and its applications. Applications of Clapeyron-Clausius Equation. Van't Hoff's Reaction Isochore and Isotherm. Raoult's Law and deviations from the same. Concept of Critical Temperature and applications.Concept of Transport Number and its determination. • Understand the applications and Limitations of Valence Bond Theory. Concept of Hybridization and its applications.Basic Postulates of Molecular Orbital Theory and determination of Bond Order, bond energy and magnetic behavior of the compound. • Reactions and reactivity of halogenated hydrocarbons. Nomenclature, nature, type and reactivity of carbon-metal bond of Organomagnesium and organolithium compounds. Preparation and reactions of Organomagnesium and organolithium compounds. Nomenclature, Preparation and reactions of Alcohols, phenols and epoxides. Comparative acidic strengths of alcohols and phenols.

Course Code:USCH302
Course Title: General Chemistry Paper 2
Outcome of the Course: After completing this course student will be able to: • Understand mechanisms of some condensation reactions. Active methylene compounds and their synthetic applications. Concept of electron deficient compounds and its correlation with Lewis acidity; · Structure and bonding in diborane and tetraborane-formation of banana bond. Synthesis of Borax-compound with commercial importance. The electronic configuration of group 14 elements. Silicon compounds-their occurrence, structure and inertness of SiO2. Synthesis of commercially important hydride of nitrogen i.e. Ammonia by Haber's process. Physicochemical principles involved in the synthesis. • Understand study of reaction rates, rate laws, and factors that influence the rate of chemical reactions. They should learn about the rate equation, rate constant, reaction orders, and how to determine the rate law from experimental data.

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Course Code:USCH303
Course Title: Analytical Chemistry Paper 3

Outcome of the Course:After completing this course student will be able to:

- Select a method of analysis. Decide how to identify a sample and prepare it for analysis. Select a procedure for analysis. Identify sources of possible errors in the results obtained.
- Understand classical methods of chemical analysis. Appreciate the various terms and types of titrimetric analysis. Able to select proper titrimetric method. Appreciate the usefulness of the gravimetric method of analysis. Identify a suitable gravimetric method. Perform the required

calculations involved in the analysis by titrimetry as well as gravimetry.

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Semester-IV

Course Code:USCH401
Course Title: General Chemistry Paper 1
Outcome of the Course: After completing this course students will be able to: • Significance of Gibbs' and Helmholtz Free Energy and its applications to EMF measurements. types of Electrodes and Electrochemical Cells. Nernst Equation and its importance. Action · ·. · Phase Rule and its applications to One-Component and Two-Component systems. • Various Properties of Transition Metals. Basic Terms involved in Co-ordination chemistry, Werner's Theory · Applications of Co-Ordination Compounds. Nature of the Metal-Ligand Bond. • Reactions and reactivity of Carboxylic and sulphonic Acids and their derivatives.

Course Code:USCH402
Course Title: General Chemistry Paper 2
Outcome of the Course: After completing this course students will be able to • Nomenclature, nature, type and reactivity of Amines and Diazonium Compounds. Preparation and reactions of Heterocyclic Compounds- Furan, Pyrrole and Thiophene. • understand the laws of crystallography, symmetry elements, bravais lattice types and use of x-rays in crystal structure determination • U catalysis, properties and types of catalyst, reactions with nanoparticles as catalyst and to derive the Michaelis-Menten equation • Understand the behavior of ions in aqueous solutions and their role in chemical reactions. Identify and classify different types of ions, including cations and anions. Explain the process of ionization and dissolution of compounds in water. Describe the principles of acid-base reactions and the role of ions in pH determination. Analyze the properties and reactivity of volatile oxides. Recognize the environmental impact of volatile oxides, including their contribution to air pollution and formation of smog and acid rain.

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Course e:USCH403
Course Title: Analytical Chemistry Paper 3
Outcome of the Course: After completing this course students will be able to • Understand the importance of separation in sample treatment. Various methods of separations. How to select a method of separation of an analyte from the matrix. How a solute gets distributed between two immiscible phases. Principle of solvent extraction and various terms involved therein. Effect of various parameters on solvent extraction of a solute. Classification of Chromatographic methods. Paper and thin layer chromatography and using them in practice. • Understand the nature of interaction between applied electrical potential and the concentration of the analyte. The nature of chemical reactions that influence potential of a given cell. Recognise the various types of electrodes or half cells. Appreciate the nature, need and importance of pH. • Use the statistical methods in chemical analysis. Understand nature of indeterminate errors.The randomness of such errors and its distribution around a correct or acceptable result. Computation of Confidence limits and confidence interval. Test for rejection of doubtful result. Method to draw best fitting straight line.

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Semester-V

Course Code:USCH501
Course Title: Physical Chemistry Paper 1
Outcome of the Course: After completing this course students will be able to: • Understand concepts of Rotational, Vibrational and Raman Spectra of Molecules. Application of Raoult's Law and Clapeyron Equation to study Colligative Properties. Advanced Kinetic Studies. Surface Chemistry and its application to Colloids. Basic concept of nuclear chemistry, detection and measurement of radioactivity. application and use of radioisotopes as tracers.

Course Code:USCHP01
Course Title: Physical Chemistry Practical
Outcome of the Course: After completing this course students will be able to: • Determine the molecular weight of compound by Rast Method. Determine the order between K2S2O8 and KI by fractional change method. Investigate the adsorption of acetic acid on activated charcoal and test the validity of Freundlich adsorption isotherm. Determine the solubility product and solubility of AgCl potentiometrically using chemical cell. Determine the velocity constant of alkaline hydrolysis of ethyl acetate by conductometric method. Determine acidic and basic dissociation constants of amino acid and hence to calculate isoelectric point.

Course Code:USCH502
Course Title: Inorganic Chemistry Paper 2
Outcome of the Course: After completing this course students will be able to:: • Understand Importance of symmetry in chemistry. Concept of Point Group. Correlation between Bond angle and Molecular Orbitals. Band Theory and its application to metals. Structure of Solids and their defects. Comparison between Lanthanides and Actinides. Properties and Application of Uranium. Properties of Xenon and other noble gases.

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Course Code:USCH503
Course Title: Organic Chemistry
Outcome of the Course: After completing this course students will be able to:: • Understand Fundamentals of Organic Reaction Mechanisms and photochemistry. Advanced Concepts in Stereochemistry and agrochemicals. Application of IUPAC nomenclature rules to spiro, bicyclo and heterocyclic compounds. Fundamentals of Green Chemistry and their applications to Organic Synthesis. Concepts of spectroscopy and natural products.

Course Code:USCH504
Course Title: Analytical Chemistry Paper 4
Outcome of the Course: After completing this course students will be able to:: • Understand the concept of Sampling and various methods of sampling. Importance of Quality Control. Basic Principles of Redox, Precipitation, Complexometric and Non-Aqueous titrations. · Applications of Advanced Instrumental methods.

Course Code:USACDD501
Course Title:Applied Component Drugs and Dyes Paper 5
Outcome of the Course: After completing this course students will be able to::: • Understand fundamental concept of Drugs, routes for drug administration and dosage forms, pharmacodynamics agents, analgesics, antipyretics, anti-inflammatory drugs. • Gain deep knowledge of dyes, their types, substrate for dyes, classification of dyes based on applications and dyeing methods, applicability on substrates. Concept of optical brightner.

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Semester-VI

Course Code:USCH601
Course Title: Physical Chemistry Paper 1
Outcome of the Course: After completing this course students will be able to: • Have decent knowledge of Nuclear Magnetic Resonance and Its applications and electron spin resonance. Polymer Chemistry Renewable Energy Sources. Basics of Quantum Chemistry and electrochemistry.

Course Code:USCH602
Course Title: Inorganic Chemistry Paper 2
Outcome of the Course: After completing this course students will be able to: • Understand advantages of Crystal Field Theory over Valence Bond Theory. Calculations of CFSE and its applications. Applications of MOT to octahedral complexes. Spectral Analysis of Inorganic Compounds- Determination of terms, term symbols and Orgel Diagrams. Thermodynamic and Kinetic Stability of Complexes. Types of Reactions shown by Metal complexes.General Characteristics of Organometallic Compounds Concepts of metallurgy, Chemistry of Group 18 and Basics of Bioinorganic Chemistry.

Course Code:USCH603
Course Title: Organic Chemistry Paper 3
Outcome of the Course: After completing this course students will be able to: • Understand Carbohydrates and their structures. Reactions shown by Glucose. General applications of various catalysts and Reagents. Basics of Polymer chemistry, Amino acids, nucleic acids, nucleic acid etc. Applications of Spectral techniques to Structure Determination. Basics of stereochemistry and Molecular rearrangements.

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CourseCode:USCH604
Course Title: Analytical Chemistry Paper 4
Outcome of the Course: After completing this course students will be able to: • Understand the Basic Principles and Applications of Advanced sophisticated techniques. Advantages and limitations of these techniques. Industrial relevance of these techniques. Basic Principles, Applications and comparison of Electroanalytical Methods. Applications of Analytical methods to day-to-day life. • Gain knowledge about basics of food and cosmetics industry. Also thermal methods of analysis and analytical method validation.

Course Code:USACDD601
Course Title: Applied Component Drugs and Dyes Paper 5
Outcome of the Course: After completing this course students will be able to: • Gain deep knowledge in drug discovery, design and development, drug metabolism and chemotherapeutic agents, drug intermediates, drug and environmental aspects and nanoparticles in medicinal chemistry. • Understand about classification of dyes based on chemical constitution and synthesis of selected dyes, health and environmental hazards of synthetic dyes and their remediation process, non-textile uses of dyes.

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