Vivekanand Shikshan Sanstha's
Vivekanand Institute of Advanced Studies in Management Science & Communications, Aurangabad.
Institute Recognised by Government of Maharashtra & Affiliated to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
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PO- BBA

At the end of BBA PROGRAM in VIVEKANAND Institute/LPPIMSIT the graduate will

PO 1	Develop Entrepreneurial perspective
PO 2	Acquire Knowledge of business functions and associated regulations
PO 3	Develop Problem solving abilities
PO 4	Advance Professionalism and Interpersonal skills
PO 5	Advancement of Leadership qualities and teamwork ability
PO 6	Demonstrate and develop Sensitivity towards Environmental issues
PO 7	Acquire Administrative and managerial skills with desired technical proficiency
PO 8	Develop Critical and analytical thinking abilities
PO 9	Work on Global perspective and lifelong learning
PO 10	Understand ethical perspective and social issues

BBA Semester I

After completion of each course students will develop ability to:

Semester	Subject Name & Code	COURSE OUTCOME
BBA Semester I	**Business Accountancy I (101-I)**	CO 1. Demonstrate accounting skills in business and economic world. CO 2. Interpret the principles of accounting , book keeping and cash book. CO 3. Understand the applications of accounting rules in determining financial results and preparation of financial statemen with analytical perspective. CO 4. Understand the utility of double entry accounting system.

		CO 5. Comprehend different methods of depreciation with critical thinking
BBA Semester I	**Management Perspective I (102-II)**	CO 1. Understand fundamental concepts and principles of management CO 2. Interpret evolution of management schools essential for administration . CO 3. Interpret concept of objective in business with its scope and applications CO 4. Explain work of management thinkers for business development CO 5. Comprehend applications of management theories and approaches with critical thinking
BBA Semester I	**Business Statistics (103-III)**	CO 1. Comprehend the concept and scope of statistics . CO 2. Understand types and classification of data with analytical perspective CO 3. Application of various statistical tools. CO 4. Identify and apply various methods of survey
BBA Semester I	**IT Fundamentals (104-IV)**	CO 1. Understand fundamentals of computer CO 2. Identify utility of computer equipment, including both hardware and software. CO 3. Understand need and characteristics of data for business . CO 4. Interpret the concept of Data Communication. CO 5. Distinguish use of the Microsoft Office programs to create professional and academic documents.
BBA Semester I	**Human Communication in Business (105-V)**	CO 1. Classify types and process of communication in business CO 2. Describe the process of e-mail communication and business correspondence. CO 3. Identify barriers to communication with ethical context. CO 4. Describe ways of effective communication for business efficiency. CO 5. Understand role of communication in management context
BBA Semester I	**Business Organisation (201)**	CO 1. Understand role and functions of modern business CO 2. Describe business environment with types of business with analytical approach CO 3. Interpret functions of business institution CO 4. Understand various factors of business environment and the idea of business as an economic entity. CO 5. Understand business initiative and associated technological aspects
	Elective	

BBA Semester II

After completion of each course students will develop ability to:

BBA Semester II	**Business Accountancy II (106)**	CO 1. Describe concept and methods of goodwill for business with social perspective. CO 2. Understand preparation of receipt and payment accounts. CO 3. Understand accounts of non-trading with company final accounts CO 4. Describe concept of Single Entry System . CO 5. Apply steps to prepare income and expenditure account with balance sheet for business .
BBA Semester II	**Management Perspective II (107)**	CO 1. Understand functions of management with its importance CO 2. Classify plans with its nature and process for the advancement of managerial skills CO 3. Understand process of staffing and recruitment in organization. CO 4. Focus on concept and theories of directing and motivation and leadership. CO 5. Describe technique and process of coordination and control in context of management .
BBA Semester II	**Business Economics (108)**	CO 1. Understand the nature and scope of business economics CO 2. Analyze law of demand and supply with its application in business economics . CO 3. Understand utility analysis for business. CO 4. Understand Utility Analysis and its usage. CO 5. Understand concept of national income
BBA Semester II	**Environmental Awareness-I (109)**	CO 1. Understand concept of environment awareness CO 2. Describe structure and components of ecological factors CO 3. Understand the ecosystem and ecology in environment. CO 4. Classify environmental pollution and its effect on environment CO 5. Understand role of population ecology in environment.
BBA Semester II	**Administrative Practices (110)**	CO 1. Understand role of company executives CO 2. Focus on law and procedures of meetings for efficient administration. CO 3. Describe types of meetings ,rights with restrictions regarding meeting . CO 4. Interpret powers and duties of chairman and the requisites of valid meeting. CO 5. Understand concept of voting with security of documents and filing information.
BBA Semester II	**IT Application in Business-I (203)**	CO 1. Understand application of tools and features of MS WORD CO 2. Focus on create ,edit ,format ,word documents. CO 3. Understand MS-Excel with its commercial application. CO 4. Apply various tools of MS POWER POINT for presentation
	Elective	

BBA Semester III

After completion of each course students will develop ability to:

BBA Semester III	**Cost Accountancy I (XIII)**	**CO 1. Understand the concept of cost accounting.** **CO 2. Work on concepts of business overheads and calculate it for business .** **CO 3. Understand preparation of cost sheet in organization practical point of view.** **CO 4. Illustrate process of cost accounting for normal and abnormal losses & gains.** **CO 5. Interpret operating costing with various methods and techniques for effective management**
BBA Semester III	**Management Perspective III (XIV)**	**CO 1. Understand recent trends in management for global scenario.** **CO 2. Interpret concept of Production management in industry with its significance ,scope and specification .** **CO 3. Describe concept of material management with its application system for effective working .** **CO 4. Infer inventory management and supply chain management for business organization** **CO 5. Recognize various areas of management for effective administration**
BBA Semester III	**Environmental Awareness II (XV)**	**CO 1. Recognize the importance of environment for the sustaining of not just business but the planet earth.** **CO 2. Understand various causes of pollutions and its effect on environment** **CO 3. Distinguish factors associated with Population explosion and its impact on environment** **CO 4. Infer various social environment issue and its link with business** **CO 5. Understand various regulations related to environmental issues and sustainability.**
BBA Semester III	**Business Law I (XVI)**	**CO 1. Infer regulations and act related to business regulations in India** **CO 2. Understand about creation and termination of the contract of agency** **CO 3. Interpret regulations of Consumer Act and associated ethical factors** **CO 4. Describe regulations and ethical issues in Cyber act** **CO 5. Interpret negotiable instruments for business**
BBA Semester III	**Entrepreneurship Development (XVII)**	**CO 1. Understand economic and social factor associated with entrepreneurship** **CO 2. Discover entrepreneurial skills and management function of an organization .** **CO 3. Classify the type and steps involved in an entrepreneurial venture.** **CO 4. Understand various factors of environment and business opportunities.** **CO 5. Analyze components of business competition and industry analysis.**
BBA Semester III	**Human factor in Business (XVIII)**	**CO 1. Infer competency in the identification and application of human problems at workplace and teamwork.** **CO 2. Understand theories and models of human factors and human performance and leadership skills** **CO 3. Recognize principles of learnings for organizations and individual outcomes.** **CO 4. Analyze factors of group dynamics to identify role of interpersonal skills** **CO 5. Point out Human factors for strengthening business environment and competency.**
	elective	

BBA Semester IV

After completion of each course students will develop ability to:

BBA Semester IV	**Cost Accounting II (XIX)**	**CO 1. Differentiate concept of Cost accounting and Financial Accounting judgements in management** **CO 2. Understand different types of costing for business** **CO 3. Infer methods of costing used for business management and administration** **CO 4. Analyze relevant costs for decision making** **CO 5. Determine budgetary control with management perspective.**
BBA Semester IV	**Management Perspective IV (XX)**	**CO 1. Determine the importance and perspective of financial management and relevant managerial skills** **CO 2. Understand concept of capital market and relevant decisions with analytical approach** **CO 3. Infer feature and applications of investment and dividend decisions.** **CO 4. Determine evolution and role of Human resource management.** CO 5. **Identify functions of Human Resource management with HRD.**
BBA Semester IV	**Business Law II (XXI)**	**CO 1. Understand regulations of Contract act as per Indian Business Law** **CO 2. Infer various provisions of Company Law as per need of business** **CO 3. Determine regulations of SEBI Act 1992 with respect to stock market in India.** **CO 4. Understand technical aspects and ethical issues of Cyber & IT Act for the safety of business.** CO 5. **Identify provisions of MSMED Act 2006 for the business administrations and entrepreneurship development.**
BBA Semester IV	**Operational research (XXII)**	**CO 1. Identify and develop operational research models from the verbal description of the real system with decision making** **CO 2. Understand the transportation models and solutions that are needed to solve problems.** **CO 3. Determine use of inventory management techniques necessary for business management with analytical thinking** **CO 4. Improve critical thinking about business decision analysis** CO 5. **Understand project scheduling for better administration in business**
BBA Semester IV	**Retail Management (XIV)**	**CO 1. Understand concept of retail management with global perspective** **CO 2. Identify various Schools of retail management thoughts as per business environment** **CO 3. Determine strategic planning for retail management** CO 4. **Infer method of retail merchandising with its process for business progress** CO 5. **Understand role and duties of merchandiser with social responsibility**.
BBA Semester IV	**IT Application in business II (XXXVI)**	**CO 1. Understand the concept and applications of database management** **CO 2. Understand analysis of data by using technical skills as per business requirement** **CO 3. Identify applications of computers in accounting for better administration** **CO 4. Infer IT applications of TALLY, ERP for accounting practices related to business** CO 5. **Demonstrate IT applications for handling data with the help of MS ACCESS**

BBA Semester V

After completion of each course students will develop ability to:

Semester V	**Management Accounting (XXV)**	**CO 1. Advance the knowledge in concern with business finance and appropriate management decision.** **CO 2. Infer and analyze various ratios used in financial management to understand progress of business.** **CO 3. Understand computation of cash flow statement for organizations** **CO 4. Demonstrate a basic understanding of management accounting.** CO 5. **Analyze financial statement used for management accounting and associated decisions**.
Semester V	**Management Perspective V (XXVI)**	**CO 1. Interpret decision making in management and associated factors** **CO 2. Infer and analyze stress management practices for better business environment and efficiency** **CO 3. Recognize concept of public relation management with its functions and other aspects to maintain relations for business** **CO 4. Describe practices of project management with human aspects** **CO 5. Infer office management and discover and develop skills for it**
Semester V	**Capital Market I (XXVII)**	**CO 1. Understand the concept and role of capital market in Indian Financial System** **CO 2. Analyze investment alternatives and related risk in the capital market** **CO 3. Infer structure and regulations associated with investor protection for capital market in India** **CO 4. Understand working of institutions and agencies associated with capital market** CO 5. **Interpret guidelines and regulations of new issue market and depository participants**
Semester V	**Institutional Assistance to Business (XXVIII)**	**CO 1. Understand role and policy measures of development banks and financial institutions in India.** **CO 2. Infer functioning and guidelines of commercial banks and development banks** **CO 3. Understand the institutional framework for international trade** **CO 4. Analyze role of various agencies for entrepreneurial development.** **CO 5. Infer Central Government schemes for business development**
Semester V	**Taxation Law I (XXIX)**	**CO 1. Understanding Indian taxation system** **CO 2. Infer the relationship between residential status of an assesses and its relationship with the tax incidence.** **CO 3. Analyze concept of incomes under different head with sections of Indian income tax law** **CO 4. Understand various ways of tax planning and determination of taxable income of an individual.** **CO 5. Analyze legal aspects of Income tax return to acquire skill of calculation of tax**
Semester V	**E Business and Internet (XXX)**	**CO 1. Understand e-Commerce and e-Business and their different platform.** **CO 2. Understand business models of E- marketing.** **CO 3. Infer online financial services with all recent changes as per global need .** **CO 4. Acquire knowledge about e-Business systems and network topology** **CO 5. Analyze growth of e-Commerce and associated regulatory act**

BBA Semester VI

After completion of each course students will develop ability to:

Semester VI	**Auditing (XXXI)**	**CO 1. Understand various auditing methodologies.** **CO 2. Infer better grasp of what is auditing and current trends of computerized audits** **CO 3. Comprehend the difference between cost and management audit with power and duties of auditors.** **CO 4. Understand the concept of cooperative audit and its role in cooperative sector.** CO 5. **Understand concept of tax audit, related regulations as per tax law.**
Semester VI	**Management Perspective VI (XXXII)**	**CO 1. Understand different aspects of strategic management for business** **CO 2. Infer concept of inventory management with relevant cost and demands** **CO 3. Understand concept of quality management with its importance for business.** **CO 4. Infer risk management and methods to manage risk with problem solving abilities** CO 5. **Understand various aspects of modern management**
Semester VI	**Capital Market II (XXXIII)**	**CO 1. Understand concept and role of capital market with Indian Financial System** **CO 2. Understand working of Indian stock exchange and related laws and regulations.** **CO 3. Infer various instruments of trading with regulations and procedures.** **CO 4. Infer merchant banking with thrift institution in Indian context.** CO 5. **Analyze derivative market , its nature with related regulations**.
Semester VI	**Project (XXXIV)**	**CO 1. Understand about nature of project and its area of work to select project title and** **CO 2. Understand how to write project synopsis with its contents.** **CO 3. Infer process of problem identification, formulation and solution to complete project report** **CO 4. Examine application of selected topic in organization with data collection methodology.** CO 5. **Analyze collected data as per methodology of project and write a project report**
Semester VI	**Taxation Laws II (XXXV)**	**CO 1. Understand the technical terms related to Income Tax** **CO 2. Infer concept of capital gain with associated regulations** **CO 3. Analyze income from other sources with its calculation.** **CO 4. Determine various deductions as per Indian income tax law** **CO 5. Understand and execute computation of income tax of individual as per income tax law regulations.**
Semester VI	**Management Support System (XXXVI)**	**CO 1. Understand the basic concepts and technologies used in the field of management information systems** **CO 2. Infer decision support system and its use in management.** **CO 3. Understand concept of MIS and its use in business.** **CO 4. Analyze managerial level decision making for business** **CO 5. Infer strategic planning and knowledge management system with its significance.**

BCS Program Outcome:

1. Grasp core knowledge and applications of computer science.
2. Demonstrate and develop proficiency in programming languages and web technologies with a practical approach.
3. Innovation perspective with technical approach for betterment of the society.
4. Technical proficiency in database Management, System Analysis and critical thinking with computation knowledge.
5. Develop system solution involving both hardware and software.
6. Implementation of advance Professionalism for project management, interpersonal skills and teamwork.
7. Problem finding and solution with software.
8. A commitment to lifelong learning and keeping up with evolving technologies.
9. Effectively engage with society through coherent documentation and compelling presentations.
10. Competency for higher studies and employability.

Course Outcomes:

Subject title: Computer Fundamental

CO1	Knowledge of computer fundamental, CPU functionalities and computer organization.
CO2	Understanding the concept of software and hardware.
CO3	Understanding the number of system and its conversion between different types of system.
CO4	Understanding Internet and world wide web.

Subject title: Digital Electronics (CS-112 T)

CO1	Understand number systems and conversions.
CO2	Identify and analyze various logic gates with their truth tables and logic symbols.
CO3	Design and implement combinational circuits.
CO4	Design and analyze sequential logic circuits and simplify Boolean expressions using Karnaugh maps

Subject title: Operating System I (CS-113 T)

Course Outcome:

CO1	Understand difference between system software and application software.
CO2	Understand types of operating system, basic functions of O.S and Evolution of O.S
CO3	Understand concept of process, process control block and threads.

CO4	Understand the CPU scheduling Non premptive and premptive algorithms, deadlock.

Subject title: Programming in C

Course Outcome:

CO1	Propositional function, statements, well formed formulas.
CO2	Study set theory concepts, matrices and operations on them.
CO3	Binary relations, posets, functions, mathematical induction and pigenonhole principle.
CO4	Study concepts in graphs and trees and its types.

Subject title: Communication Skill

Course Outcome:

CO1	Understand the different styles of communication.
CO2	Understand the effective speaking skills and develops effective reading comprehensions.
CO3	Understand how to write a good personal profile and improve one's presentation skills.
CO4	Able to communicate in daily life in English.

Course Outcome

CO1	Understand the basic principles of programming, including algorithms, data types, and control structures.
CO2	Learn to develop simple algorithms and flow charts to solve a problem.
CO3	Understand the importance of software engineering principles in the development process.
CO4	Able to do documentation for their code, including comments, function and class descriptions, and user guides.

Semester II

Subject title: Data Structure

Course Outcome:

CO1	Ability to understand fundamental data structures like arrays, linked lists,stack queues, trees, graphs
CO2	Able to construct algorithm.
CO3	Understanding of basic algorithmic complexity.
CO4	Able to understand searching and sorting algorithms.

Subject title: 8086 Microprocessor

Course Outcome:

CO1	Understand functional block diagram of 8086 microprocessor.
CO2	Understand functions of each pin of 8086 microprocessor.
CO3	Understand use of instructions in different addressing modes.
CO4	Learn the modular programming with Assemblers and linkers using instructions.

Subject title: Operating System II

Course Outcome

CO1	Gain knowledge of four pillars of operating systems
CO2	Understand concept of file, operations of file, file allocation methods.
CO3	Understand disk fundamental, disk scheduling, disk management
CO4	Understand dedicated devices, shared devices, I/O devices, I/O Hardware, Interrupts.

Subject title: Advance programming in C

Course Outcome

CO1	Understand user defined datatypes in C programming.
CO2	Understand pointers in C programming.
CO3	Gain knowledge of storage classes and preprocessors and string handling functions.
CO4	Able to deal with file handling using C programming.

Course Outcome:

CO1	Understand errors and identify type of it.
CO2	Able to calculate approximate values by using approximation techniques.
CO3	Study of algorithms and formulate numerical problems using different numerical methods.
CO4	Understand interpolation with its different techniques.

Subject title: DBMS

Course Outcome

CO1	Understanding of the basic concepts of databases, including data models, data manipulation, and data definition.
CO2	Able to design a database schema, normalize it to reduce redundancy.
CO3	Understand different issues involved in the design and implementation of a database system.
CO4	To understand and use of various SQL statements.

Subject title: Communication Skill-2

Course Outcome:

CO1	Understand the significance and essence of a wide range of soft skills in social and professional settings.
CO2	Employ soft skills to improve interpersonal relationship and to enhance employ ability and ensure workplace and career success.
CO3	Able to deal with time and stress management skills.
CO4	Learn leadership and assertiveness skills.

III Semester

Subject title: Advance Data Structure (CS301-T)

Course Outcome

CO1	Able to study binary trees and AVL trees.
CO2	Able to understand memory representation of graphs and trees.
CO3	Understand graph traversal algorithms.
CO4	Study of searching and sorting techniques, Hash functions.

Subject title: Unix Operating system

Course Outcome:

CO1	Understanding of Unix OS features, structure and file system.

CO2	Study of various Unix commands.
CO3	Able to study Piping and I/O redirection symbols.
CO4	Learn to deal with VI editor.

Subject title: PC maintenance (CS303-T)

Course Outcome:

CO1	Understand the major hardware components of PC like CPU, motherboard, memory, storage devices, and peripherals.
CO2	Understand environment and interface of common desktop operating system.
CO3	Understand software and hardware maintenance of PC/ Laptop.
CO4	Understand the importance of security and protect PC/laptop from malicious softwares.

Subject title: Programming in CPP (CS304-T)

Course Outcome:

CO1	Understanding OOP's features using CPP programming.
CO2	Deal with class and object.
CO3	Understand the concept of inheritance and polymorphism.
CO4	Understand the importance of generic datatype.

Subject title: RDBMS

Course Outcome:

CO1	Understanding of the basic concepts of databases, including data models, and SQL.
CO2	Able to design a database schema, normalize it to reduce redundancy, and optimize its structure for efficient data retrieval and storage.
CO3	To understand the different platforms involved in the design and implementation of a database system.

CO4	To study the physical and logical database designs, database modelling, types of SQL Commands.

Subject title: Computational Statistics using R

CO1	Understanding of fundamental statistical concepts.
CO2	To understand data, types of data and collection techniques and data visualization.
CO3	Understand importance and evaluate Measures of central tendency.
CO4	Understand importance and evaluate Measures of dispersion.

IV Semester

Subject title: Software Engineering (CS401-T)

CO1	Understand the importance and role of software engineer.
CO2	Understand fundamental software engineering concepts and software development models.
CO3	Understand concept of agility and models.
CO4	Understand principles for software development.

Subject title: Fedora (CS402-T)

CO1	Able to gain a strong understanding of open source and free Linux OS.
CO2	Proficiency in installing Fedora, setting up the system, and configuring hardware and software components.
CO3	Familiarity with Fedora's package management system (RPM/YUM) and ability to install, update, and manage packages.
CO4	Skills in system administration tasks, including user management, file system management and permissions.

Subject title: Basics of Networking (CS403-T)

CO1	Understand fundamentals of networking concepts.

CO2	Learn the terminology and concepts of the reference models.
CO3	Learn the concepts of protocols and interfaces.
CO4	To be familiar with contemporary issues in networking technologies.

Subject title: Core Java (CS404-T)

CO1	Understanding OOP's concepts using Java.
CO2	Understand control structures and looping.
CO3	Understand how to handle exceptions in Java.
CO4	Understand data abstraction, packages in Java

Subject title: Advance DBMS

Course Outcome

CO1	Understand advanced strategies to improve the performance of database systems & Transaction Management.
CO2	Understand designing complex database schemas, including normalization.
CO3	Understand the concepts of Concurrency Control & Serializability.
CO4	Understand concept of deadlock & deadlock handling.

Subject title: Web Fundamental (CS406-T)

Course Outcome

CO1	Understand Internet and web technology.
CO2	Able to create static web pages.
CO3	Able to apply CSS on web pages.
CO4	Apply javascript and create dynamic web pages.

V Semester

Subject title: Software Cost Estimation (CS501-T)

Course Outcome

CO1	Learn different software cost estimation techniques.
CO2	learn to gather and analyse historical data from past projects to inform the cost estimation process.
CO3	Deal with various estimation models and tools commonly used in the industry and apply them effectively.
CO4	Understand how to use empirical estimation models to estimate software project costs.

Subject title: Android OS (CS502-T)

Course Outcome:

CO1	Understand fundamentals of Android OS, its architecture, and how it fits into the broader mobile device ecosystem.
CO2	Learn to develop Android applications using Java or Kotlin, including creating user interfaces, handling user input, and implementing functionality.
CO3	Understand the lifecycle of Android apps, including activities, services, and how to manage app states effectively.
CO4	Learn about various data storage options on Android, such as Shared Preferences.

Subject title: Core Java-II (CS503-T)

Course Outcome:

CO1	Understand file handling concepts using Java.
CO2	Able to create web page using applet.
CO3	Able to connect to a database using JDBC and perform basic database operations.
CO4	Able to debug Java programs effectively and troubleshoot common programming issues.

Subject title: Computer Graphics (CS504-T)

Course Outcome:

CO1	Understand the basics of Computer Graphics and their applications.
CO2	Understand the working principle of Display devices.
CO3	Learn Character generation, algorithm and filling of objects
CO4	Deal with geometric transformations of 2D objects.

Subject title: Computer Graphics (CS504-T)

Course Outcome:

CO1	Understand webpage development using server-side scripting.
CO2	Learn to use conditional and looping statements.
CO3	Deal with functions in PHP which enhance code modularity and reusability.
CO4	Learn arrays, string and OOP's concept in PHP.

Subject title: Beginners Prog with PHP (CS505-T)

Course Outcome:

CO1	Understand webpage development using server-side scripting.
CO2	Learn to use conditional and looping statements.
CO3	Deal with functions in PHP which enhance code modularity and reusability.
CO4	Learn arrays, string and OOP's concept in PHP.

Subject title: Advanced Networking (CS508-T)

Course Outcome:

CO1	Understand data transmission using OSI reference model.
CO2	Understand the concept of data link and network layer.
CO3	Understand communication of process to process and congestion control.
CO4	Understand the network techniques like hamming code, linear block code etc.

VI Semester

Subject title: Software Quality & Testing (CS601-T)

Course Outcome:

CO1	Understand the importance of quality software.
CO2	Learn to identify bugs, defects and errors in software.
CO3	Understand test processes, design test plan and test cases for quality improvement.
CO4	Apply the software testing techniques.

Subject title: Android Application Development (CS602-T)

Course Outcome:

CO1	Understand the process of packaging and deploying Android apps.
CO2	Deal with techniques to optimize app performance.
CO3	Design and develop user Interfaces for the Android platform.
CO5	Save state information across important operating system events.

Subject title: Theory of Computation (CS603-T)

Course Outcome:

CO1	Understand the concept of computation model and formal languages.
CO2	Learn about finite automata as abstract computational models and their relationships to formal languages.
CO3	Understand how to recognize and generate languages with different types of automata.
CO5	Deal with Chomsky's hierarchy of formal languages.

Subject title: Advanced Computer Graphics (CS604-T)

Course Outcome:

CO1	Understand fundamental principles of computer graphics.
CO2	Learn to create and manipulate 3D graphics objects.

CO3	Understand the importance of viewing and projections.
CO4	Learn to design an application with the principles of virtual reality.

Subject title: Advanced Prog. With PHP (CS605-T)

Course Outcome:

CO1	Learn to embed PHP within HTML.
CO2	Learn to input-output and validate forms using PHP.
CO3	Understand and create state management (cookies, sessions and Query strings).
CO4	Understand MySQL database and connectivity to database with web pages.

Subject title: Ethics and Cyber law (CS608-T)

Course Outcome:

CO1	Understand legal framework governing cyberspace, including relevant laws, regulations, and international treaties.
CO2	Learn about various forms of cybercrimes.
CO3	Learn ethical way of using computer, computer networks and Internet.
CO4	Aware about IT act 2000 as well as 2008.

M.Sc. (Computer Science) 2021-22

Programme Outcomes (POs)

PO1: Advanced Knowledge: Apply advanced principles of computer science to solve complex theoretical and practical problems across various domains.

PO2: Research Competency: Conduct independent research, formulate hypotheses, design

experiments, and analyze results using appropriate scientific methodologies.

PO3: Problem Solving and Innovation: Identify, analyze, and provide innovative solutions to real-world computing problems using appropriate tools and technologies.

PO4: Programming and System Design: Design and develop efficient software systems and algorithms with a strong grasp of programming paradigms and software engineering

practices.

PO5: Data Handling and Analysis: Manage, analyze, and interpret large-scale data using modern computational and statistical tools.

PO6: Ethical and Social Responsibility: Understand and apply ethical principles and recognize the social impact of computing technologies on individuals, organizations, and society.

PO7: Communication Skills: Communicate technical information effectively through oral

presentations, technical reports, and scientific publications.

PO8: Teamwork and Leadership: Function effectively as a member or leader in diverse teams,

demonstrating collaboration and management skills in multidisciplinary settings.

PO9: Lifelong Learning: Recognize the importance of self-directed learning and continuously

update knowledge in the rapidly evolving field of computer science.

PO10: Adaptability and Professionalism: Adapt to emerging technologies and practices while demonstrating professionalism, responsibility, and a commitment to quality.

Semester I

Research Methodology

CO1: Introduce the basic concepts and significance of research in the context of scientific and academic disciplines.

CO2: Enable students to identify and define research problems, formulate hypotheses, and set appropriate research objectives.

CO3: Provide knowledge of various research designs and methodologies, including qualitative, quantitative, and mixed methods.

CO4: Familiarize students with data collection techniques, sampling methods, and tools used for data analysis.

CO5: Develop skills for analyzing and interpreting data using appropriate statistical methods and software tools.

Core Java

CO1: Introduce the fundamentals of Java programming language, including syntax, semantics, and object-oriented principles.

CO2: Develop an understanding of object-oriented programming (OOP) concepts such as classes, objects, inheritance, polymorphism, encapsulation, and abstraction using Java.

CO3: Enable students to write efficient, reusable, and modular Java code using packages, interfaces, and exception handling.

CO4: Familiarize students with Java's built-in libraries and utilities, including collections, I/O streams, multithreading, and file handling.

CO5: Develop graphical user interfaces (GUIs) using AWT and Swing components in Java.

Introduction to Algorithm

CO1: Introduce the fundamental concepts of algorithms and problem-solving techniques, including the analysis of algorithm efficiency.

CO2: Develop the ability to design algorithms using standard paradigms such as divide and conquer, dynamic programming, greedy algorithms, and backtracking.

CO3: Understand the principles of algorithm analysis, including time and space complexity, Big O, Big Θ (Theta), and Big Ω (Omega) notations.

CO4: Explore and analyze classical algorithms for searching, sorting, graph processing, and optimization.

CO5: Provide a foundation in data structures such as arrays, linked lists, trees, heaps, and graphs that support algorithm design.

Relational Database Management System (RDBMS)

CO1: Introduce the fundamental concepts of database systems, including data models, architecture, and relational algebra.

CO2: Develop skills in designing relational databases using Entity-Relationship (ER) models and normalization techniques.

CO3: Enable students to write efficient SQL queries for data definition, manipulation, and retrieval.

CO4: Provide knowledge of transaction management, concurrency control, and database recovery techniques.

CO5: Familiarize students with database management tools and systems, and prepare them for working with real-world database applications.

Mathematical Foundation

CO1: Introduce fundamental mathematical concepts such as logic, sets, relations, and functions relevant to computer science.

CO2: Develop problem-solving skills using mathematical reasoning and proof techniques, including induction and contradiction.

CO3: Provide an understanding of combinatorics and graph theory, essential for algorithm design and analysis.

CO4: Explore number theory and its applications in areas like cryptography and data security.

CO5: Strengthen the ability to model and analyze computational problems using formal mathematical tools and techniques.

Modern Operating Systems

CO1: Provide a comprehensive understanding of operating system concepts, including processes, threads, memory management, and file systems.

CO2: Study process synchronization, deadlocks, and concurrency control in modern multi-core and distributed environments.

CO3: Introduce advanced memory management techniques, including virtual memory, paging, and segmentation.

CO4: Explore modern OS architectures and components, such as microkernels, monolithic kernels, and real-time systems.

CO5: Familiarize students with security, protection mechanisms, and performance evaluation in contemporary operating systems.

Semester II

Technical Report Writing

CO1: Develop the ability to plan, structure, and write clear and concise technical documents such as reports, proposals, and manuals.

CO2: Enhance skills in technical communication, including the use of appropriate style, tone, and vocabulary for professional audiences.

CO3: Train students in the proper use of visuals like charts, graphs, and tables to support written content effectively.

CO4: Introduce standard formats and citation styles used in technical and academic writing, ensuring ethical use of information.

CO5: Prepare students for effective oral presentations and professional communication in technical settings.

Advanced Java

CO1: Build on core Java concepts and introduce advanced features such as multithreading, networking, and JDBC for database connectivity.

CO2: Develop web-based applications using Java technologies like Servlets and JSP (JavaServer Pages).

CO3: Understand and apply Java frameworks such as JavaBeans, Hibernate, or Spring for enterprise application development.

CO4: Enhance the ability to design and implement dynamic, secure, and scalable applications using advanced Java tools and APIs.

CO5: Prepare students for real-world software development by integrating frontend and back-end technologies in Java-based solutions.

Data Communication

CO1: Introduce the fundamental concepts of data communication and networking, including transmission modes, protocols, and standards.

CO2: Understand the components and functions of data communication systems, such as transmitters, receivers, and communication channels.

CO3: Study data encoding, modulation techniques, and error detection/correction methods for reliable data transfer.

CO4: Explore various transmission media and network topologies, and their impact on communication performance.

CO5: Develop knowledge of network protocols, architectures, and standards, preparing students to design and analyze communication networks.

Digital Image Processing

CO1: Introduce fundamental concepts and techniques of digital image processing, including image acquisition, representation, and enhancement.

CO2: Develop skills in image transformation, filtering, and restoration for improving image quality.

CO3: Understand and implement segmentation and feature extraction methods for analyzing images.

CO4: Explore image compression techniques for efficient storage and transmission.

CO5: Familiarize students with practical applications of image processing in fields such as medical imaging, computer vision, and multimedia.

Artificial Intelligence

CO1: Introduce the fundamental concepts and techniques of artificial intelligence, including problem-solving, search algorithms, and knowledge representation.

CO2: Develop an understanding of machine learning, reasoning, and decision-making methods used in AI systems.

CO3: Explore intelligent agents and their architectures for solving complex real-world problems.

CO4: Familiarize students with natural language processing, computer vision, and robotics as key AI applications.

CO5: Encourage ethical considerations and societal impacts related to the deployment of AI technologies.

Machine Learning

CO1: Introduce the fundamental concepts and types of machine learning, including supervised, unsupervised, and reinforcement learning.

CO2: Develop skills in designing and implementing machine learning algorithms such as regression, classification, clustering, and dimensionality reduction.

CO3: Understand evaluation metrics and techniques for assessing the performance of machine learning models.

CO4: Familiarize students with popular machine learning libraries and tools for practical data analysis and model building.

CO5: Explore real-world applications of machine learning across various domains like healthcare, finance, and computer vision.

Semester III

Android Application Development

CO1: To introduce the fundamentals of Android architecture and application

components, including Activities, Services, Broadcast Receivers, and Content

Providers.

CO: To develop skills in designing and building user interfaces using XML

layouts, views, and Material Design principles.

CO3: To enable students to create functional Android applications using Java or Kotlin and Android Studio.

CO4: To familiarize students with data storage options, such as SharedPreferences, SQLite databases, and cloud-based storage.

CO5: To explore advanced Android features, including location-based services, sensors, background processing, and publishing apps on the Google Play Store.

Open Web Programming

• To introduce the core concepts of web development, including HTML, CSS, and JavaScript for building responsive user interfaces.

• To develop skills in client-side and server-side scripting using open-source technologies such as JavaScript, PHP, or Node.js.

• To familiarize students with modern web frameworks and libraries, such as React, Angular, or Vue.js for front-end development.

• To explore open web standards and protocols, including HTTP, RESTful APIs, and JSON for data exchange and communication.

• To enable students to design, develop, and deploy dynamic and interactive web applications using open-source tools and platforms.

Computer Graphics

CO1: Understand the Fundamentals-Gain a solid understanding of the basic principles of computer graphics, including rasterization, rendering, transformations, and color models.

CO2: Master Graphics Programming -Develop proficiency in using graphics APIs (such as OpenGL, WebGL, or DirectX) to create 2D and 3D visual content.

CO3: Implement Geometric Transformations -Apply mathematical concepts such as translation, rotation, scaling, and perspective projection to manipulate graphical objects.

CO4: Develop Visualization Skills-Learn how to model and visualize complex objects and scenes, including lighting, shading, and texture mapping techniques.

CO5: Solve Real-World Problems-Design and implement interactive computer graphics applications that solve practical problems or enhance user experiences, such as simulations or games.

Pattern Recognition

CO1: Learn the fundamental theories and principles of pattern recognition, including classification, clustering, and feature extraction.

CO2: Gain knowledge of statistical approaches (e.g., Bayesian classifiers) and machine learning techniques (e.g., neural networks, decision trees) for recognizing patterns in data.

CO3: Develop skills to select, extract, and reduce features to improve recognition accuracy and computational efficiency.

CO4: Implement and evaluate algorithms on real-world data sets, such as image, speech, text, or biometric data.

CO5: Design and deploy pattern recognition systems to address practical applications like handwriting recognition, face detection, or medical diagnosis.