Maharshi Karve Stree Shikshan Samstha's

K. B. Joshi Institute of Information Technology

(*Approved by Govt. of Maharashtra, *NAAC Accredited) (Affiliated by S.N.D.T. Women's University, Mumbai)

Faculty: Science & Technology

Program Outcome Document

Program: Bachelor of Computer Applications (BCA)

Dr.Swati Sayankar
Principal(O)

Prof.Rupali Saraf
IQAC Coordinator

Program 1: Bachelor of Computer Applications (BCA) ProgramCode:059

Program Outcome:

- To provide basic knowledge and foundation of Computers for solving problem.
- To impart necessary skills to get worthy career in the field of Information Technology

Program Specific Outcome: After completion of the program, the students are able:

- To pursue higher education in the field of Computer Science and Applications
- To opt lucrative MBA course
- To work in the field of Information Technology as Programmer, System Designer, Analyst, Web Developer, Tester
- To work in public sector under Government.
- To initiate own start-ups

Course Objective and Outcome

BCA Semester I:

Subject: Business and Technical Communication Skills
Subject Code: 1101
Theory: 3+ Tutorial:1

Course Objectives

- To demonstrate the fundamental concepts of interpersonal and professional communication.
- To encourage active listening with focus on content, purpose, ideas.
- To facilitate fluent speakingskills in social, academic and professional situations.
- To train in reading strategies for comprehending academic and business correspondence.
- To promote effective writing skills in business, technology and academic arenas.

Course Outcomes :

- Enable the students' ability to write error free while making an optimum use of correct Business Vocabulary & Grammar.
- Will enable the students to distinguish among various levels of organizational communication and communication barriers while developing an understanding of Communication as a process in an organization.
- They will be able to draft effective business correspondence with brevity and clarity.
- Enhance critical thinking by designing and developing clean and lucid writing skills.
- Enhance verbal and non-verbal communication ability through presentations.

Subject: Problem Solving Using C
Subject Code: 1102
Lectures : 4

Course Objectives:

- To teach students a programming language.
- To help them learn problem solving techniques.
- To teach the student to write programs in C and to solve the problems

Course Outcomes:

Students will be able

- To develop logic which will help them to create programs in C.
- Demonstrate an understanding of computer programming language concepts.
- Design and develop computer programs, analyze, and interpret the concept of pointers, declarations, initialization, operations on pointers and their usage.
- By learning the basic programming constructs they can easily switch over to any other language in future.
- Develop applications

Subject: Web Programming
Subject Code: 1103
Theory: 4

Course Objectives:

- To give insight about latest technologies to design and develop web applications using client- side scripting, server-side scripting, and database connectivity.

Course Outcomes:

- To design web pages using HTML5 language, applying stylish information to web pages using CSS.
- To develop interactive web pages using JavaScript.
- To develop dynamic pages on the web server using PHP language and implement Database Driven Websites.
- Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites
- To develop and implement client-side and server-side scripting language programs

Subject: Computer Fundamentals and Operating System
Subject Code: 1104
Theory:4

Course Objectives:

- To understand the proper working of operating system.
- To develop understanding of Computer operating system, its structures, functioning and algorithms.
- To ensure that students gain a solid understanding of the fundamental concepts modern multitasking operating system.

Course Outcomes:

- Learners will be able to describe basic concepts, mechanisms used by operating systems.
- Learners will be able to compare process scheduling algorithms, apply synchronization

primitives and evaluate deadlock conditions and to analyze virtual memory management algorithms

Subject: Office Automation Tools
Subject Code: 1105
Practical: 2

Course Objective:
- To familiarize the students in preparation of documents and presentations with office automation tools, internet and internet tools.

Course Outcomes:
- On completion, the students would be able to make word documents, spreadsheets, power point presentations using the Microsoft suite of office tools.

Subject: Problem Solving in C Lab
Subject Code: 1201
Practical:2

Course Objectives:
- To enable the students to learn a programming language.
- To learn problem solving techniques
- To teach the student to write programs in C and to solve the problems.

Course Outcomes:
The student would be able
- Read, understand and trace the execution of programs written in C language.
- Write the C code for a given algorithm.
- Implement Programs with pointers and arrays, perform pointer arithmetic, and use the preprocessor. •
- Write programs that perform operations using derived data types.
- Implement simple file operations

Subject: Web Programming Lab
Subject Code: 1202
Theory: 2

Course Objectives:
- To develop web applications using client-side scripting, server-side scripting, and database connectivity.

Course Outcomes:

- To design web pages using HTML5 language, applying stylish information to web pages using CSS.
- To develop interactive web pages using JavaScript.
- To develop dynamic pages on the web server using PHP language and implement Database Driven Websites.
- To develop and implement client-side and server-side scripting language programs

BCA Semester II:

Subject: Environmental Science and RTI
Subject Code: 2101
Environmental Science and RTI

Course Objectives:

- To help the students to acquire knowledge of pollution and environmental degradation.
- To help students acquire knowledge of the environment beyond the immediate environment including distant environment.
- To help students acquire a set of values for environmental protection.
- To provide students with an opportunity to be actively involved at all levels in environmental decision making.
- Describe the benefits of RTI.
- Identify the legal and historical foundations for RTI Course Outcomes: Students will learn to
- Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Understand the practical applicability of the Right to Information Act, 2005

Subject: Programming Methodology and C++
Subject Code: 2102
Theory:3+ Tutorial:1
Theory:4

Course Objective :
To understand how C++ improves C with object-oriented features.

- ♣ To learn how to design C++ classes for code reuse.
- ♣ To learn how to implement copy constructors and class member functions.
- ♣ To understand the concept of data abstraction and encapsulation.
- ♣ To learn how to overload functions and operators in C++.

♣ To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

♣ To learn how to design and implement generic classes with C++ templates

Course Outcomes:

- Students will be able to
- Describe the object-oriented programming approach in connection with C++
- Apply the concepts of object oriented programming
- Analyze a problem and construct a C++ program that solves it
- Discover errors in a C++ program and describe how to fix them
- Illustrate the process of data file manipulations using C++

Database Management System
Subject Code: 2103
Theory:4

- Course Objectives:
- • To introduce the concept of database management systems
- • Learn to organize, maintain and retrieve - efficiently, and effectively - information from a database management system
- • To present the concepts and techniques relating to query processing by SQL
- • To introduce the concepts of transactions and transaction processing
- • To present the issues and techniques relating to concurrency and recovery in multiuser database environments
- Course Outcomes:
- • Able to find and understand the Concept Of database approach.
- • Able to find and understand database architecture and data modeling, data Normalization.
- • Design and draw ER and EER diagram for real life problem.
- • Able to find and understand the commands of SQL.
- • Able to understand the concept of transaction, concurrency and recovery.Use new career opportunities available in IT profession, audits and others with special skills such as energy efficiency, ethical IT assets disposal, reporting and development of green products, applications and services.

Subject: Programming Methodology and C++ Lab
Subject Code: 2201
Practical:2

- Course Objectives: Will enable students to
- • Identify and practice the object-oriented programming concepts and techniques
- • Practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.
- Course Outcomes: Students will be able to:
- • Create simple programs using classes and objects in C++.
- • Implement Object Oriented Programming Concepts in C++.
- • Develop applications using stream I/O and file I/O.
- • Implement simple graphical user interfaces.
- • Implement Object Oriented Programs using templates and exceptional handling.

Subject: Database Management System Lab

Subject Code: 2202
Practical:2

Course Objectives:

- Understand, appreciate and effectively explain the underlying concepts of database technologies

Course Outcomes:

- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.

BCA Semester III:

Subject: Data Strucutres
Subject Code: 3101
Theory:4

Course objectives:

- To impart basic concepts of data structures and algorithms
- To learn fundamental concepts about arrays, linked list, stack, queue, trees and graphs
- To understand concepts about searching and sorting techniques.
- To gain knowledge about writing algorithm and step by step approach in solving problems with the help of fundamental data structures.
- To find complexity of various algorithmic methods.

Course Outcomes:

- Understand basic data structures such as array, linked list, stack, queue, binary tree and graph along with algorithms.
- Ability to analyze algorithm and algorithm correctness.
- Apply searching and sorting techniques

Subject: Java Programming
Subject Code: 3102
Theory:4

Course Objectives:

- To gain knowledge about basic Java language syntax and semantics.
- To write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, etc.
- To understand the principles of inheritance, packages and interfaces.

Course Outcomes:

- To teach Object-Oriented programming concepts, techniques, and applications using the Java programming language.
- Problem solving skills – to analyze real life problem, find and develop algorithmic steps to solve it and then implement these steps in JAVA.
- Experience with developing and debugging software in Java.
- To develop real life projects using database connectivity with JDBC..

Subject: Mathematics-II
Subject Code: 3103
Theory:4

Course objectives:

- To provide suitable and effective methods called numerical methods for obtaining approximate numerical results of the problems.
- To deal with various topics like finding roots of the equations, solving systems of linear algebraic equations, interpolation, numerical integration and differentiation, solution of differential equations and solution of matrix problems.
- To facilitate numerical computing.

Course Outcomes:

- Apply numerical methods to find solutions of algebraic equations using different methods viz. Bisection method, Regula - Falsi, Newton Raphson's, Ramanujan's method, Matrix Inversion and Gauss Elimination
- Apply Least squares Curve fitting procedures.
- Derive numerical methods for various mathematical operations and tasks such as interpolation, differentiation, integration, the solution of linear and non linear equations and solution of differential equations

Subject: Computer Organization and Architecture
Subject Code: 3104
Theory:2+Tutorial:2

Course Objectives:

- To introduce fundamental concepts of Boolean algebra, logic gates and combinational circuits
- To give a basicunderstanding of concepts and structure of computers.
- To understand the organization of Cache memory and memory management hardware.
- To study the working of different interrupts & Mapping Techniques.
- To study register organization.
- To understand the different addressing modes.

• To Demonstrate the working of central processing unit and RISC and CISC Architecture.

Course Outcomes:

• Understand the architecture and functionality of central processing unit.

• Analyze some of the design issues in terms of speed, technology, cost, performance.

• Learn the concepts of parallel processing, pipelining and inter-processor communication.

• Exemplify the I/O and memory organization.

Subject: Data Structures Lab
Subject Code: 3201
Practical:2

- Course Objectives:
- • To introduce the concepts of data structures including arrays, linked list, stack and queues.
- • To design and implement various data structure algorithms.
- • To introduce various techniques for representation of the data in the world.
- • To create programs using algorithms and also techniques of sorting and searching. Course Outcomes:
- • Select appropriate data structures as applied to specified problem definition.
- • Implement operations like traversing, insertion, deletion, searching etc. on data structures.
- • Students will be able to implement linear and non - linear data structures.
- • Implement appropriate sorting and searching techniques for given problems..

Subject: Java Programming Lab
Subject Code: 3202
Practical:2
Lecture Timings: 50min Objectives:

Course Objectives:

• To develop software skills for developing real world applications using Java Programming language.

• To enable implementation of frontend and backend of an application.

• To implement classical problems using Java programming.

- To be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:
- Basic knowledge of programming in JAVA.
- Experience with developing and debugging software in Java.
- Implementation of AWT.
- Able to develop real life projects using database connectivity with JDBC.

BCA Semester IV:

Subject: Python Programming
Subject Code: 4101
Theory: 3+Tutorial: 1

Course Objective:

- Learn the fundamentals of writing Python scripts.
- Learn core Python scripting elements such as variables and flow control structures.
- Discover how to work with lists and sequence data.
- Write Python functions to facilitate code reuse.

Course Outcome:

- Able to apply the principles of pythonprogramming.
- Write clear and effective pythoncode.
- Create applications using pythonprogramming.
- Implementing database usingSQLite.
- Access database using pythonprogramming.
- Develop web applications using pythonprogramming.
- Develop and use Web Services usingpython

Subject: Introduction to Microprocessor

Subject Code: 4102
Theory:3+Tutorial:1 Lecture
Timings: 50min Objectives:

Course Objectives:

- To learn and understand technical aspect of 8085 microprocessor.
- To understand the standard instruction set available for 8085 IC.
- To Design and develop various assembly language programs for 8085 IC and 8255 PPL.
- To learn the concept of interrupts
- To understand serial communication and interfacing.
- To understand advance microprocessor 8088/8086.

Course Outcomes:

- Understand the architecture and addressing modes of 8085 microprocessor and merory organization and its Interfacing.
- Understand various types of instructions and Instruction Cycled with proper timing diagrams.
- Develop various assembly language programs by usingdiffrent types if instructions and understand PPL interfacing.
- Understand 8259 interrupt controller IC with its internal organization and single and cascade operation.

• To understand 8086/8088 microprocessor, architecture, instruction set, addressing modes, simple programs, memory organization and interfacing

Subject: Computer Networks
Subject Code: 4103
Theory:4

- Course Objectives:
- • To study TCP/IP & OSI protocol suites
- • Learn how computer network hardware and software operate
- • Investigate the fundamental issues of network design
- • Learn about dominant network technologies
- Course Outcomes:
- • Distinguish between analog and digital signals and understand their characteristics
- • Understand the basic concepts of data communications.
- • Understand the purpose of network layered models, network communication using the layered concept, and able to compare and contrast Open System Interconnect (OSI) and the Internet Model.
- • Understand basic computer network technology.
- • Identify the different types of network topologies and protocols.
-

Subject: Software Engineering
Subject Code: 4104
Theory:4

Course Objectives:

• To understand the nature of software development and software life cycle process models, agile practices.

• To Explain methods of capturing, specifying, visualizing and analyzing software requirements.

• To understand concepts and principles of software design and user-centric approach and principles of effective user interfaces.

• To understand need of project management and project management life cycle.

• To understand project scheduling concept and risk.

Course Outcomes:

• Provide the ability to select and apply the knowledge of defined engineering technology activities.

• Able to describe key activities in software development and the role of modeling.

• Able to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

• Able to explain key concepts in software development such as change management, testing and quality.

Subject: Python Programming Lab
Subject Code: 4201
Practical:2
Course objectives:
- Install and run the Python interpreter
- Gain knowledge of Python syntax
- Learn variable declarations in Python
- Learn control structures
- Understand modules

Course Outcomes:
- Will be able to interpret the fundamental Python syntax usePython control flow statements.
- Enable the handling of strings and functions.
- Will be able to create and run Python programs by utilizing the data structures like lists, dictionaries, tuples and sets

Subject: Introduction to Microprocessors Lab
Subject Code: 4202
Practical: 2
Course Objectives:
- To become familiar with the architecture and Instruction set of Intel 8085 microprocessor..
- To be able to develop simple assembly level programs

Course Outcomes:
- The student will be familiar with the architecture and Instruction set of Intel 8085 microprocessor
- Will be able to implement assembly level programs

BCA Semester V:

Subject: Mobile Application
Subject Code: 5101
Theory:3+Tutorial:1

Course Objectives:
- Understand the application development lifecycle.
- Develop a grasp of the Android OS architecture.
- Create an android based mobile application
- Familiarize with Android's APIs for data storage, retrieval, user preferences, files and content providers
- Experiment with database to store data locally
- Identity, analyze and choose tools for Android development including device emulator, profiling tools and IDE

Course Outcomes:
- Recognizes mobile development environments...

- Write clear and effective Android code.
- Create Native & Hybrid Mobile applications using Android App Development
- Implementing database using SQLite & Firebase Real-time Database.
- Be exposed to technology and business trends impacting mobile application
- Be competent with designing and developing mobile applications using one application development framework. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network

Subject: Artificial Intelligence
Subject Code: 5102
Theory:4

Course Objectives:
- To understand the basic principles, techniques, and applications of Artificial Intelligence.
- To understand the historical perspective of AI and its foundations.
- To understand a basic understanding of the building blocks of AI.
- To understand intelligent agents: Search, Knowledge representation, inference, logic, and learning.

Course Outcomes:
- Students will be able to demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- Students will be able to understand the fundamentals of various applications of AI techniques in intelligent agents, expert systems models.

Subject: Cyber Security
Subject Code: 5103
Theory:4

Course Objectives:
- The learner will gain knowledge about protect personal data, and secure computer networks.
- The learner will be able to examine secure software and wed security. The learner will be able to find solution to the key distribution problem by using functional key pair; public key cryptography
- The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.
- The learner will be able to examine certain attacks on networks and security related services.

Course Outcomes:
The student will • Understand the basic security principals
- Understand the concepts of data confidentiality security concern and its solution through cryptography
- Be able to verify identity through various authentication mechanisms • Learn about Safeguarding the network at the network layer
- Learn about attacks on the networks and security related services

Subject: Multimedia Application

Subject Code: 5104
Theory: 4

Course Objectives:

- To learn and understand technical aspect of Multimedia Systems.
- To understand the standards available for colour model and different images, video and text applications.
- To Design and develop various Multimedia Systems applicable in real time
- To learn various multimedia authoring systems, computer graphics used for multimedia applications and Display devices.
- To understand Video signal formats and TV broadcasting system.

Course Outcomes:

- Learner will Developed understanding of technical aspect of Multimedia Systems.
- Learner will understand various file formats for images, video, text media, colour models and software tools.
- Learner will develop various Multimedia Systems applicable in real time with action script.
- Learner will design interactive multimedia softwareprogram multimedia data and be able to design and implement media applications.
- Learner will understand different graphics algorithm, Display devices, Video signal formats and TV broadcasting system.

Subject: Java Programming Lab
Subject Code: 5201
Practical: 2
Lecture Timings: 50min
Objectives:

- To learn how to extend Java classes with inheritance and dynamic binding.
- To learn how to use exception handling in Java applications.
- To understand how to design GUI components with the Java Swing API.
- To understand how to design applications with threads in Java. To learn how to read and write files in Java.

Outcome:

- Writing program in java
- Able to use inheritance to extend class
- Able to do applet and GUI programming
- Able to implement file handling in Java

Subject: Internet Programming Lab
Subject Code: 5202

Practical: 2
Lecture Timings: 50min
Outcome:

- Learn about Web Page and the basic HTML tags.
- Learning of cookies and using cookie programs in web applications Be able to create and use JavaScript programs
- Learn to create small web sites using HTML and CSS.

BCA Semester VI:

Subject: Management Information System
Subject Code: 6101
Theory:3+ Tutorial: 1
Lecture Timings: 50min
Objectives:

- Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making.
- Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives.
- Effectively communicate strategic alternatives to facilitate decision making.

Outcome:

- To Introduce the students to the Management information system
- To learn Basic terms in management & business
- To understand the working of marketing development, designing in the company
- To understand concept of information
- To learn levels in Management
- To understand financial & production functions of MIS Understand and evaluate a computer based information system.
- to understand managerial issues related to the information systems.

Subject: Enterprise Recourse Planning
Subject Code: 6102
Theory:3+Tutorial:1
Lecture Timings: 50min
Objectives

- To introduce students to Enterprise Resource Planning.
- To understand the general model of ERP and how it works.
- To gain knowledge of various ERP departments with case studies
- To understand the difference between customer, vendor and suppliers.

Outcomes

- In-depth understanding of various concepts of ERP
- Ability to understand how it works from one department to the another Ability to understand supply chain management, ERP methodologies. To understand the role of costumer, vendor, supplier in ERP system
- Gain the knowledge of who is order winner and order qualifiers.

Subject: Intellectual Property Rights & Cyber Laws
Subject Code: 6103
Theory:4
Lecture Timings: 50min
Objectives:

- To introduce fundamental aspects of Intellectual property
- To give knowledge on patents, patent regime in India and abroad and registration aspects
- To give knowledge on copyrights and its related rights and registration aspects To give knowledge on trademarks and registration aspects
- To give knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects **Outcome**

On completion of this course of study, students should be able to:

- Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems and analyse the social impact of intellectual property law and policy
- Understand IT Act 2000
- Analyse ethical and professional issues related to cyber laws and cyber crime.

Subject: Web Technology
Subject Code: 6113
Theory:2
Practical:2
Lecture Timings: 50min
Objectives:

- To understand internet and WWW
- To understand Cryptography
- To understand the syntax of Java script, Perl, ASP
- To learn security issue
- To learn web development software tools **Outcome:**
- Explain the history of the internet and World Wide Web.
- Concepts that are important in understanding web development like Digital Signature and Virtual Hosting.
- Discuss the understandings of internet programming with different scripting languages like Java script, Perl , ASP etc.
- Implement complete application over the web.
- Learn the important HTML tags for designing static pages.
- Ability to create separate design page from content using Cascading Style sheet.
- Utilize the concepts of JavaScript
- Use web application development software tools i.e. PHP and XML etc.
- Find the locations currently available in the market to design web sites.

Subject: Project
Subject Code: 6201

Practical:4
Lecture Timings: 50min

Objectives:

- Apply learning in real world
- Understand how real things are different compared to study
- What more needs to be learn before entering into industry
- Also, to learn how SDLC/System Analysis and Design work in real world.

Outcome:

- Students will able to implement knowledge in real applications
- Develop a software to solve problem
- Students will able to implement all phases of SDLC in practice
- Students are able to perform the job of Analyst, Programmer and tester.
- Insight of Software development process

Maharshi Karve Stree Shikshan Samstha's

K. B. Joshi Institute of Information Technology

(*Approved by Govt. of Maharashtra, *NAAC Accredited) (Affiliated by S.N.D.T. Women's University, Mumbai)

Faculty: Science & Technology

Program Outcome Document

Program: Master of Computer Science

Dr.Swati Sayankar
Principal(O)

Prof.Rupali Saraf
IQAC Coordinator

pg. 1

Program 3: Master Of Computer Science
Program Code: 124

Master of Computer Science[M Sc C.S.]

Program Objectives

- To prepare highly trained software professionals needed by the industry
- To inculcate research culture that will make them ready for competent world.
- To impart knowledge of latest trends in IT Industry
- To prepare them for Industry 4.0 Revolution

Program Specific Outcome

This Program will enable students

- To get knowledge of algorithm and various programming languages
- To make career in Cyber Security and digital Forensics
- To understand research methodologies and promote for the research
- To understand the Big data analytics, Artificial intelligence, Internet of Things and image processing
- To develop various mobile applications/apps using Android programming
- To develop various multimedia applications

SEMESTER-I

Subject: Operating Systems
Subject Code: 1101

Course Objectives:

- To understand components of Operating system and Operating-System Services.
- To study Process Management and Process Coordination.
- To understand the concept of Deadlock.
- To understand the concepts and implementation Memory management policies and virtual memory.
- To introduce students about file management, I/O management and Disk Management.
- To discuss Distributed File Systems and Distributed Coordination.
- To study the need of Protection and Security in operating systems using different tools.

Course Outcome:
Students will be able to:

- Describe Computer System Organization and role of operating system in their management policies.
- Understand the OS components System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems.
- Understand the Processor management policies and CPU scheduling of processes.
- Estimate the requirement for process synchronization and coordination handled by the operating system.
- Understand types of Distributed File System and Distributed Coordination.
- Identify the different security tools in operating systems such as Cryptography, User

Authentication, Implementing Security Defenses etc.

Subject: Software Engineering and Project Management
Subject Code: 1102

Course Objectives:

- To introduce the students to the Software Project and Project Planning.
- To define the Goal and Scope of the Software Project.
- To understand the need of the SRS, need of software requirement analysis and specification.
- To be successful professionals in the field with fundamental knowledge of software engineering
- To improve strong communication and interpersonal skills, as well as professional and ethical principles when working as members and leaders of multidisciplinary teams.

Course Outcomes:

Students will be able to:

- Students can learn how to apply the software engineering lifecycle by demonstrating applicability in communication, Software planning, Software analysis, Software design and deployment.
- Students can learn how to work as an individual and as part of a multidisciplinary team to develop and deliver quality software
- Ability to understand about different Testing Methodologies.
- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software development lifecycle.

Subject: Data Structures and Analysis of Algorithm
Subject Code: 1103
Course Objective:

- To introduce the fundamental concept of data structures.
- To emphasize the importance of data structures in developing and implementing efficient algorithms.
- To develop effective software engineering practice, emphasizing such principles as decomposition.
- Focusing on procedural abstraction, and software reuse.

Course Outcome:

Students will be able to:

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
- Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.
- Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs.
- Demonstrate different methods for traversing trees.
- Compare and contrast the benefits of dynamic and static data structures implementations.
- Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack.

- Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.

Subject: Cyber Security
Subject Code: 1104

Course Objectives
- To highlight the importance of cyber security
- To focus on the cyber security threats and vulnerabilities
- To understand the Intrusion detection and prevention techniques
- To understand cryptography
- To introduce them to Cyber law and Cyber Forensics

Course Outcome
This course will enable the students :
- To understand the importance of Cyber security
- To understand intrusion detection and prevention techniques
- To understand cryptography
- To understand cyber space, cyber law and cyber forensics

Subject: Data Communications & Networking
Subject Code: 1105

Course Objective:
- To Build an understanding of the fundamental concepts of computer networking.
- To give knowledge ofprotocols, Inter Networking and reference Models.
- To make them understand design issues in Layers of OSI.
- To Introduce the concepts of Collison, Congestion and Routing.
- To get Knowledge of Data Communication with Encoding, Multiplexing and Switching.
-

Course Outcomes:
After completing this course the student will be able to:
- Understand basic computer network technology.
- Understand different protocols and Network Models.
- Explain various Layers of OSI and TCP/IP reference model.
- Understand the functions and responsibilities of various layers like Framing, Flow Control, and Routing etc.
- Identify the different types of Networks and network topologies
- Implement Error detection and correction techniques.

Subject: Operating Systems Lab
Subject Code: 1201

Course Objectives:
- To demonstrate installation of Operating System on VM
- To understand file system and file commands
- To understand UNIX operating system with its features and functions
- To exercise and practice Unix commands, Process operations and Network commands
- To introduce programming with BASH shell

Course Outcome:

After successful completion of Operating System Lab sessions students will be able to:

- Install Operating System on virtual machine.
- Understand file system and file commands
- Work in Unix shell environment
- Write and test Unix commands
- Construct programs in BASH shell

Subject: Data Structure Lab
Subject Code:1202

Objectives:

- To understand classification of DS
- To study different data structures like Stack, Queue, Tree, Graph
- To study implementation and applications of Data structures
- To study various searching and sorting methods

Outcome

After completion of Lab session, the student will able to

- Handle basic operations on Data Structures like Arrays, stack and queue.
- Implement working of Linked list using pointers.
- Build real time applications of linked list.
- Suggest appropriate use of all types of DS.
- Understand the implementation of Tree and Graph in practical

Semester II

Subject: Web Technology
Subject Code: 2101
Course Objective:

- On completion of this course, a student will be familiar with Dynamic web programming.
- Student able to develop a web application using HTML5,Jquery,Angular JS, PHP,AJAX.
- Students will gain the skills and project-based experience.
- Students are needed for entry into web application and development careers.

Course Outcome:

- Students are able to develop a dynamic webpage by the use of HTML5, Jquery, Angular JS, PHP,XML.
- Students will be able to write a well formed / valid XML document.
- Students will be able to connect a web program Angular JS , PHP.
- Students will be able to write a front end /back end side web application using PHP, Angular JS, Jquery ,and xml.

Subject: Computer Organization and Architecture
Subject Code: 2102
Course Objectives:

- To understand the basic concepts of Computer, building blocks of computer.
- To understand the concept of Memory Organization.
- Understand the concept of Data Representation and Arithmetic Algorithms.
- To explain different types of Input and Output devices.

- To understand the concept of System Organization.
- Summarize the Processor Organization and Architecture.

Course Outcome:

Students will be able to:

- Students understand the concept of computer and its Architecture.
- Students understand the concept of Memory Organization as internal memory and external memory.
- Exemplify in a better way the I/O devices.
- Define binary data representation, two's complement representation ,Floating-point representation and Integer Data computation .
- Students learn the concept about CPU Architecture.
- Students understand how to use the computer in communication

Subject: Database Management Systems

Subject Code: 2103

Course Objectives:

- To present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
- To develop an understanding of essential DBMS concepts such as: database security,integrity, concurrency
- To understand file organization and indexing
- To Understand query and transaction

Course Outcome:

After successful completion of this course, students will be able to:

- Describe the fundamental elements of relational database management systems
- Explain 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
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
- Improve the database design by normalization.
- Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

Subject: Design & Analysis of Algorithms

Subject Code: 2104

Course Objectives

- Analyze the asymptotic performance of algorithms.
- Write algorithms using heap, sorting techniques.
- Demonstrate a various sorting and analysis techniques.
- Students are able to learn how to design dynamic programming.
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.

Course Outcomes

- Students are able to analysis the process.
- Students are able to write programing using divide and conquer technique.
- Students are Clear the idea about heap process.
- Enhancement of programming strategy using backtracking, branch & bound and greedy methods.

- Students are able to check out performance of the program using algorithm.

Subject: Web Technology Lab
Subject Code: 2201
Course Objective:

- On completion of this course, a student will be familiar with client server architecture and able to develop a web application using HTML5,Jquery,Angular JS, PHP,AJAX technologies To create fully functional website/web application.

Course Outcome:

- Students are able to develop a dynamic webpage by the use of HTML5,Jquery,Angular JS, PHP,AJAX .
- Students will be able to write a well formed / valid XML document. ·
- Students will be able to connect a PHP program to a DBMS and perform insert, update and delete operations on DBMS table. ·
- Students will be able to write a Jquery, Angular JS front end technology.

Subject: DBMS Lab
Subject Code: 2202
Course Objectives:

- To introduce structured query language
- To teach oracle
- To make student understand table design and table manipulation
- To introduce concepts of normalization
- To introduce Procedures and functions
- To make student understand PL/SQL execution.

Course Outcome:

- Students are able to write query in SQL.
- Able to create database and table.
- Implement the operations on database like insertion, deletion, updating, searching etc.
- Able to write and define Constraints.
- Alter Table and Fields.
- Can join two tables with different join operations
- Understand the normalization and its Types.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.

Semester II - Elective

Elective I(Option 1)

Subject: Software Testing and Tools
Subject Code: 2111

Course Objectives:

- Expose the students to different software testing tools and techniques.
- Students are able to get the idea about Software Testing Methodology.
- Describe the software testing processes.
- Students gaining knowledge about Automation Testing Approach.
- Enhancement of agile technique.

Course Outcomes:

- Students are able to implementation of software matrices in software design, coding, testing and implementation phase.
- Students can understand the Automation Testing Approach.
- Using agile technique more chances to improvement of software developing phase.
- Students are able to learn software validation / verification process and different Testing aspects.
- Students are able to create/prepare test plan.

Elective I(Option 2)

Subject: BIG DATAANALYTICS

Subject Code: 2112

Course Objective:

Students will try to learn:

- To introduce students to Big Data analytics.
- To explain to students the different tools of analyzing Big data such as Hadoop, Map Reduce.
- To understand the concept of PIG, execution modes of PIG.
- To introduce students to the concept of Hadoop Ecosystem.
- To introduce students to Data Analytics with R Machine Learning.

Course Outcome:

Students will be able to:

- Understand the concept of Big data and compare the Digital data and big data for various applications.
- Ability to understand fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce.
- Ability to understand Hadoop Ecosystem, introduction of PIG and Hive.
- Ability to understand and apply scaling up R machine learning techniques and associated computing techniques and technologies.

Elective I(Option 3)

Subject:Computer Graphics
Subject Code:2113
Course Objectives

- To give insight of Computer graphics applications
- To teach various algorithms and Modelling techniques

Course Outcomes

At the end of the course Student will be able

- To learn Computer Graphics applications
- To learn various algorithms required for Computer Graphics
- To learn Modelling transformations

Elective I(Option 4)

Subject: Enterprise Recourse Planning
Subject Code: Elective I (2114)

Course Objectives

- To introduce students with fundamental concepts in Enterprise Resource Planning.

- To build understanding of ERP architecture, Implementation and modules
- To gain knowledge of various ERPs with case studies e.g. Supply Chain Management and Customer Relationship Management
- To make students understand the different ERP related Technologies

Course Outcomes

After successful completion of course students will able to:

- Understand fundamental concepts of ERP
- Implement various Modules like finance, Human Recourse, Marketing etc.
- Explain ERP architecture
- Understand supply chain management, ERP methodologies.
- Gain the knowledge of who is order winner and order qualifiers
- Manage ERP integration and Security Issues.
- Practically implement case studies

Semester III

Subject: Object Oriented Programming with Java
Subject Code: 3101

Course Objective:

- Programming in the Java programming language,
- Knowledge of object-oriented paradigm in the Java programming language,
- The use of Java in a variety of technologies and on different platforms.
- Knowledge of web programming using jsp ,servlet.

Course Outcome:

- Summarize the strengths and weaknesses of Java programming and the basic concepts of object-oriented programming.
- Identify Java code utilities in applets, Java packages, and classes.
- Student can be write GUI Programming and Multithreading.
- Write Java code using JDBC, for connect java to database.
- Student can be write advanced java programming.
- Student can be gaining web server knowledge.

Subject: Data Warehousing & Data Mining
Subject Code: 3102
Course Objective: Students will try to learn

- To identify the concept of Data warehousing and Data mining.
- To introduce the student about Data Design and Data representation.
- To explain various Data mining Algorithms for respective applications.
- To study about Spatial and web data mining.
- To understand data mining primitives, Languages and system architectures.

OUTCOME: Students will be able to:

- Students understand Data warehousing fundamentals and data mining principles
- Design data warehousing with dimensional modeling and OLAP operations.
- Understand the different data mining algorithms to solve real world problems.
- Students understand spatial and temporal mining.
- Develop Applications and trends in data mining

Subject: Research Methodology
Subject Code:3103
Course Objectives

- To understand the objectives, types and methods of research
- To study various Sampling methods
- To understand statistics in research
- To learn hypotheses techniques

Course Outcomes

At the end of the course Student will be able

- To understand the objectives of research, its types and methods
- To define research problem and study techniques involved in defining it
- To understand Sampling design, its types, sample size determination
- To learn Measurement and Scaling Techniques in Research
- To understand various hypotheses testing techniques

Subject: Mobile Application Development using Android Programming
Subject Code: 3104

Course objectives:

- To introduce fundamentals of Android operating system, Android Software Development platform, its versions and features
- To make students understand Android Programming with knowledge of designing UI, data management, intent objects.
- To develop Android applications
- To develop messaging and location based services.

Course Outcomes:
After successful completion of this course, students will be able to:

- Understand and implement fundamentals of Android operating systems
- Use Android software development platform
- Develop software with reasonable complexity on mobile platform
- Deploy software to mobile devices
- Understand the security issues & debugging

Subject: Object Oriented Programming with Java Lab

Subject Code:3201

Course Objective:

- Covers software design, implementation, and testing using Java.
- Introduces object-oriented design techniques and problem solving.

- Emphasizes development of secure, well-designed software projects that solve practical real-world problems.

Course Outcome:

- Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
- Read and make elementary modifications to Java programs that solve real-world problems.
- Students are write a java program using jsp and servlet.
- Document a Java program using Javadoc.
- Students are write a code using GUI and JDBC packages.

Subject: Android Programming Lab
Subject Code: 3202

Course objectives:

- To introduce basics of Android operating system, Android development Environment, APIs and UI components
- To apply Java Programming in Android application development
- To demonstrate communication between Intents
- To introduce SQLite Programming for handling databases
- To explain Treads and advanced concepts in App development
- To learn development of Mobile applications

Course Outcomes:

After successful completion of this course, students will be able to:

- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Demonstrate the communication between Intents.
- Develop an app to demonstrate Database Usage
- Handle programming with SQLite
- Develop mobile applications

Semester III- Electives

Elective II(Option 1)

Subject: Image Processing
Subject Code:3121
Course Objectives:

- To explain basic principles of Digital image processing.
- To introduce students to Image enhancement in spatial domain.
- To study Image Enhancement in the Frequency Domain like smoothening, sharpening and homomorphic filtering.
- To introduce students to Image Segmentation and image data compression.
- To explain Image Morphological Operation and Basic Morphological Algorithms.

Course Outcome:

Students will be able to:

- Understand the general terminology of digital image processing.
- Evaluate the techniques for Image enhancement in spatial domain.
- Evaluate the methodologies for image segmentation, restoration etc
- Interpret the Image compression standards.
- Understand the Morphological operation like Dilation erosion , Opening & Closing, Hit or Miss Transform.

Elective II(Option 2)

Subject: Digital Forensics (MSc CS Sem-III)
Subject Code:3122
Course Objectives

- To introduce the concept of Digital Forensics
- To study importance of Digital evidence
- To study network forensics
- To study system investigation
- To study various laws along with Computer laws

Course Outcomes

At the end of the course Student will be able

- To learn cybercrime and its types
- To understand Initial response and forensic duplication
- To understand Preserving and Recovering Digital Evidence
- To learn network forensics
- To learn system investigation
- To give insight of various Bodies of law

Elective II(Option 3)

Subject: Geographical Information System

Subject Code:3123

Course Objective:

- Introduction to GIS is designed to provide the students with an understanding of the methods and theories of spatial analysis.
- that will allow students to apply GIS knowledge and skills to everyday life and their chosen careers.
- Interpretation of GIS –maps, non-cartographic output, spatial multimedia, decision support.
- Introduction of remote sensing techniques.
- Developing applications using :Global Positioning Systems (GPS):

Course Outcome:

- Students will learn how to compile, analyze, and present geospatial data while emphasizing the value of visual communication.
- Students will learn these basic geospatial concepts using industry standard GIS technology.
- Students able to get knowledge of GPS.
- Students are gaining skills of remote sensors technology.

Elective II(Option 4)

Subject: Internet of Things
Subject Code: 3124

Course Objectives:

- To introduce basic characteristics, design and blocks of IoT
- To understand difference between IoT and M2M(Machine to Machine)
- To learn various challenges in design, development and security of IoT
- To gain knowledge of various real-time applications of IoT
- To understand IoT applications and Embedded systems
- To learn implementation of IoT with Python

Course Outcome:
After Successful completion students will able to

- Understand basic characteristics, design and blocks of IoT
- Differentiate between IoT and M2M(Machine to Machine)
- Identify challenges in design, development and security of IoT. Also students will able to provide solutions over challenges.
- Understand domain specific applications of IoT
- Design IoT applications and Embedded systems
- Develop IoT tools using Python

Elective II(Option 5)

Subject: MULTIMEDIAAPPLICATIONS (ELECTIVE II)
Subject Code: 3125

Course Objective:
Students will try to learn:

- To understand the concept of Multimedia.
- To understand the different standards available for Audio ,Video and Image compression.
- To introduce the student about Multimedia Network Applications.
- To explain various networking aspects used for multimedia applications.
- To explain the student about Framework for Multimedia standards.

Course Outcomes:
Students will be able to:

- Understand the concept of multimedia and technical aspects of multimedia.
- Develop various file formats for Audio, Video and image.
- Apply various networking protocols for multimedia applications.
- To evaluate the framework for multimedia applications.
- To evaluate the multimedia application for its optimum performance.

Semester IV

Subject: Research Seminar (MSc CS Sem-IV)
Subject Code:4101
Course Objectives

- To apply the knowledge of research methodology in research
- To define research problem and give solution to it by way of research

Course Outcomes

At the end of the course Student will be able

- To explore various areas of research
- To define research problems
- To find solutions to problem through research
- To present research paper with applying research principles
- To develop presentation skills

Subject: Internship Projects

Subject Code:4102

Course Objective:

- A practice-oriented and 'hands-on' working experience in the real world or industry, and to enhance the student's learning experience.
- An opportunity to develop a right work attitude, self-confidence, interpersonal skills and ability to work as a team in a real organizational setting.
- An opportunity to further develop and enhance operational, customer service and other life-long knowledge and skills in a real world work environment.
- Pre-employment training opportunities and an opportunity for the company or organization to assess the performance of the student and to offer the student an employment opportunity after his/her graduation, if it deems fit.

Course Outcome:

- Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s.
- Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course;
- Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means;

- Exhibit critical thinking and problem solving skills by analyzing underlying issue/s to challenges;
- Recommend ideas to improve work effectiveness and efficiency by analyzing challenges and considering viable options;
- Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders;
- Exhibit professional ethics by displaying positive disposition during internship.

Maharshi Karve Stree Shikshan Samstha's

K. B. Joshi Institute of Information Technology

(*Approved by Govt. of Maharashtra, *NAAC Accredited) (Affiliated by S.N.D.T. Women's University, Mumbai)

Faculty: Science & Technology

Program Outcome Document

Program: Bachelor of Science(Information Technology)

Dr.Swati Sayankar
Principal(O)

Prof.Rupali Saraf
IQAC Coordinator

Program : Bachelor of Science (IT)
Program Code:81

Course Objective and Outcome

BSc(IT) Semester I:

Branch: B.Sc.(IT)	**Semester-I**
Subject Code: 1101	**Lecture: 02** **Credit: 02**
Course Opted	**Ability Enhancement Compulsory Course-I**
Subject Title	**Communication Skills**

Course Objectives

- To make SWOT as a tool to identify Individual's and Organization's Strengths, Weaknesses, Opportunities and Threats.
- To demonstrate the fundamental concepts and methods of communication.
- To learn positive body language for better connect.
- To enable students to build strong vocabulary for effective writing and communication.
- To promote technology driven communication through Emails, telephone and Power Point presentations.
- To facilitate fluent speaking skills in social, academic and professional situations.

Course Outcomes

- SWOT analysis will help to improve personality or business by identifying and working on it
- Positive body Language will enable students to break the barrier of unfamiliarity and helps to form a better connect with the recipients of information
- Develop interpersonal skills for effective communication by understanding methods of Communication
- Enhance verbal and non-verbal communication ability through Vocabulary Building, Body language, Presentations.
- Provide with the practical skills and knowledge necessary to express themselves clearly, with confidence and power, in a variety of speaking situations.

Branch: B.Sc.(IT)	**Semester-I**
Subject Code: 1102	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course-1 (Theory)**
Subject Title	**PROBLEM SOLVING USING C**

Course Objectives:

- The course is designed to provide complete knowledge of C language.
- Students will be able to develop logics which will help them to create programs, applications in C.

- Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. Able to define data types and use.
- By learning the basic programming constructs, they can easily switch over to any other language in future.
- The students will be able to develop applications

Course Outcomes:

- Students will be able to develop logic which will help them to create programs in C.
- Demonstrate an understanding of computer programming language concepts.
- Ability to design and develop Computer programs, analyze, and interpret the concept of pointers, declarations, initialization, operations on pointers and their usage.
- Able to define data types and use.
- By learning the basic programming constructs, they can easily switch over to any other language in future.
- The students will be able to develop applications
-

Branch: B.Sc(IT)	**Semester-I**
Subject Code: 1201	**Lecture: 02** **Credit: 02**
Course Opted	**Core Course-1 (Practical)**
Subject Title	**PROBLEM SOLVING USING C LAB**

Course Objectives:

- To enable the students to learn a programming language.
- To learn problem solving techniques
- To teach the student to write programs in C and to solve the problems.

Course Outcomes:

The student would be able

- Read, understand and trace the execution of programs written in C language.
- Write the C code for a given algorithm.
- Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor. •
- Write programs that perform operations using derived data types.
- Implement simple file operations

Branch: B.Sc.(IT)	**Semester-I**
Subject Code: 1103	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course-2 (Theory)**
Subject Title	**Introduction to IT & Operating Systems**

Learning outcomes:

a) To understand basic organization of computer and different computer peripherals and interfaces,

b) To define different number systems their interconversion and binary arithmetic.

c) To understand the basics of Networking

d) To understand the main components of an operating system and their functions.

e) To describe the various CPU scheduling algorithms and remove deadlocks.

f) To understand the concepts and implementation Memory management policies and virtual memory.

g) To use disk management and disk scheduling algorithms for better utilization of external memory.

Branch: B.Sc(IT)	**Semester-I**
Subject Code: 1202	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course 2 - Practical**
Subject Title	**UNIX/LINUX- Operating Systems – LAB**

Branch: B.Sc.(IT)	**Semester-I**
Subject Code: 1104	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course-3 (Theory)**
Subject Title	**Mathematics-I**

Course Objective:

- To introduce fundamental concepts of differential and applications of discrete structures and differential equations in the field of computer science
- Work with matrices and determine if a given square matrix is invertible.
- To learn about First order differential equations
- To introduce the basics of the theory of sets and some of its applications.

Learning Outcomes:

- After the completion of the course, Students will be able to
- Find the inverse of a square matrix. Solve the matrix equation Ax = b using row operations and matrix operations. Find the determinant of a product of square matrices, of the transpose of a square matrix, and of the inverse of an invertible matrix
- Will understand First order differential equations
- Will learn the basics of the theory of sets and some of its applications

Branch: B.Sc(IT)	**Semester-I**
Subject Code: 1105	**Lecture: 02** **Credit: 02**
Course Opted	**Skill Enhancement Course - 1**
Subject Title	**PRINCIPLES & PRACTICES OF ACCOUNTS**

Course objective:-

- Introduces students to the world of accounting and understanding basics concepts of accounting to final account.
- The objective of the course is to strengthen the fundamentals of accounting and provide strong foundation for other accounting courses.
- It will be demonstrated how a practical understanding and interpretation of accounting reports and other accounting tools can improve decision-making in the organization.

Course Outcomes:-

- Students will be able to learn fundamental accounting concepts, Conventions & terminologies.
- Students will be able to describe the importance, functions & objectives of books of entry, subsidiary books, bank reconciliation statement and Final accounts.
- Students will be able to prepare books of entry, subsidiary books, bank reconciliation statement and Final accounts using double entry book keeping.

BSc(IT) Semester II:

Branch: B.Sc.(IT)	**Semester-II**
Subject Code: 2101	**Lecture: 02** **Credit: 02**
Course Opted	**Ability Enhancement Compulsory Course-II**
Subject Title	**Environmental Science**

Course Objectives:

- To help the students to acquire knowledge of pollution and environmental degradation.
- To help students acquire knowledge of the environment beyond the immediate environment including distant environment.
- To help students acquire a set of values for environmental protection.
- To provide students with an opportunity to be actively involved at all levels in environmental decision making.

Course Outcomes:
Students will learn to

- Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Branch: B.Sc(IT)	**Semester-II**
Subject Code: 2102	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course -4**
Subject Title	**PROGRAMMING METHODOLOGY AND C++**

Course Objectives:

- To understand how C++ improves C with object-oriented features.
- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To understand the concept of data abstraction and encapsulation.
- To learn how to overload functions and operators in C++.
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to design and implement generic classes with C++ templates.

Course Outcomes:

- Students will be able to
- Describe the object-oriented programming approach in connection with C++
- Apply the concepts of object oriented programming
- Analyze a problem and construct a C++ program that solves it
- Discover errors in a C++ program and describe how to fix them
- Illustrate the process of data file manipulations using C++

Branch: B.Sc(IT)	**Semester-II**
Subject Code: 2201	**Lecture: 02** **Credit: 02**
Course Opted	**Core Course -4 Practical**
Subject Title	**PROGRAMMING METHODOLOGY AND C++ LAB**

Course Objectives:

- Will enable students to
- Identify and practice the object-oriented programming concepts and techniques
- Practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.
- **Course Outcomes**:

Students will be able to:

- Create simple programs using classes and objects in C++.
- Implement Object Oriented Programming Concepts in C++.
- Develop applications using stream I/O and file I/O.
- Implement simple graphical user interfaces.
- Implement Object Oriented Programs using templates and exceptional handling

Branch: B.Sc.(IT)	**Semester-II**
Subject Code: 2103	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course- 5(Theory)**
Subject Title	**Data Structures using 'C'**

Branch: B.Sc(IT)	**Semester-II**
Subject Code: 2202	**Lecture: 02** **Credit: 02**
Course Opted	**Core Course -5 Practical**

Subject Title	Data Structures using 'C' LAB

Course Objectives:

- To introduce the concepts of data structures including arrays, linked list, stack and queues.
- To design and implement various data structure algorithms.
- To introduce various techniques for representation of the data in the world.
- To create programs using data structure algorithms and also techniques of sorting and searching.

Course Outcomes:

- Select appropriate data structures as applied to specified problem definition.
- Implement operations like traversing, insertion, deletion and searching etc. on various data structures.
- Students will be able to implement linear and non - linear data structures.
- Implement appropriate sorting and searching techniques for given problems.

Branch: B.Sc.(IT)	Semester-II
Subject Code: 2104	Lecture: 04 Credit: 04
Course Opted	Core Course- 6
Subject Title	Mathematics II

Course Objective:

The subject aims to provide the student with:

- Mathematics fundamental necessary to formulate, solve and analyze computer science problems.
- An understanding of Fourier Series and Laplace Transform to solve real world problems.
- An understanding of numerical methods.
- An understanding of Complex integration.

Course Outcomes:

The student will be able to

- Analyze and solve computer science problems
- Understand the applications of Fourier Series and Laplace Transform to solve real world problems
- Apply numerical methods to find solutions of algebraic equations using different methods viz. Bisection method, Regula - Falsi, Newton Raphson's, Ramanujan's method, Matrix Inversion and Gauss Elimination
- Understand Complex Integration

Branch: B.Sc.(IT)	Semester-II
Subject Code: 2105	Lecture: 02 Credit: 02
Course Opted	Skill Enhancement Course - 2
Subject Title	Technical Writing

Course Objectives

- To emphasis need and importance of Technical Communication
- To acquaint with process of Technical Writing
- To introduce various user guides
- To introduce the concept of Translation and Localisation
- To understand the importance of working environment

Course Outcomes

- Understand the process of Technical Writing
- Understand Various User Guides
- Aware about the concepts of Translation and Localization
- Aware about the Working environment required for technical writing
- Writing Project Proposal, Software Project Documentation and Report writing

Branch: B.Sc.(IT)	Semester-III
Subject Code: 3101	Lecture: 04 Credit: 04
Course Opted	Core Course – 7
Subject Title	DATABASE MANAGEMENT SYSTEMS

Course Objectives:

- To introduce the concept of database management systems
- Learn to organize, maintain and retrieve information efficiently and effectively from a database management system
- To present the concepts and techniques relating to query processing by SQL
- To introduce the concepts of transactions and transaction processing
- To present the issues and techniques relating to concurrency and recovery in multiuser database environments

Course Outcomes:

The student would be able to

- Understand the Concept of database approach.
- Understand database architecture and data modeling, data Normalization.
- Design and draw ER and EER diagram for real life problem.
- Understand the commands of SQL.
- Understand the concept of transaction, concurrency and recovery.

Branch: B.Sc.(IT)	Semester-III
Subject Code: 3201	Lecture: 02 Credit: 02
Course Opted	Core Course Practical – 7
Subject Title	DATABASE MANAGEMENT SYSTEMS – LAB

Course Objectives:

- Understand, appreciate and effectively explain the underlying concepts of database technologies

Course Outcomes:

- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.

- Programming SQL including stored procedures, stored functions, cursors, packages.

Branch: B.Sc.(IT)	Semester-III
Subject Code: 3102	Lecture: 04 Credit: 04
Course Opted	Core Course – 8
Subject Title	JAVA PROGRAMMING

Course Objectives:

- To make students aware of various OOP concepts and their implementations.
- To enable students to install and use various versions of JAVA & some of its editors.
- To enable students to write, compile, run & debug java programs using core java language.
- Implementation of various OOP entities like classes, objects, inheritance etc. using java.
- To learn JAVA dealing with GUI & IO devices.
- Learning advanced Java features like Generics, Multi-Threading, Autoboxing etc.

Course Outcomes:

- Basic knowledge of programming in JAVA.
- Experience with developing and debugging software in Java.
- Developing software skills for developing real world applications using Java Programming language.

Branch: B.Sc.(IT)	Semester-III
Subject Code: 3202	Lecture: 02 Credit: 02
Course Opted	Core Course Practical - 8
Subject Title	JAVA PROGRAMMING - LAB

Course Objectives:

- To make students aware of various OOP concepts and their implementations.
- To enable students to install and use various versions of JAVA & some of its editors.
- To enable students to write, compile, run & debug java programs using core java language.
- Implementation of various OOP entities like classes, objects, inheritance etc. using java.
- To learn JAVA dealing with GUI & IO devices.
- Learning advanced Java features like Generics, Multi-Threading, Autoboxing etc.

Course Outcomes:

- Basic knowledge of programming in JAVA.
- Experience with developing and debugging software in Java.
- Developing software skills for developing real world applications using Java Programming language.

Branch: B.Sc.(IT)	Semester-III
Subject Code: 3103	Lecture: 04 Credit: 04
Course Opted	Core Course - 9

Subject Title	COMPUTER NETWORKS

Course Objectives:

- To study TCP/IP & OSI protocol suites
- To develop an understanding of computer networking basics
- Learn how computer network hardware and software operate
- Investigate the fundamental issues of network design
- To develop an understanding of different components of computer networks, various protocols, modern technologies and their application
- Students will be able to describe and execute network administrator duties and utilities.

Course Outcomes:

- Characterize and appreciate computer networks from the view point of components and from the view point of services
- Display good understanding of the flow of a protocol in general and a network protocol in particular
- Model a problem or situation in terms of layering concept and map it to the TCI/IP stack
- Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS, Bit torrent) as per the requirements of the network application and work with available tools to demonstrate the working of these protocols.
- Design a Reliable Data Transfer Protocol and incrementally develop solutions for the requirements of Transport Layer.
- Recognize transport layer services and infer UDP and TCP protocols
- Classify routers, IP and Routing Algorithms in network layer
- Describe the essential principles of Network Layers and use IP addressing to create subnets for any specific requirements
- Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
- Describe Networking and Network Management
- To understand various protocols for network security to protect against the threats in the networks.

Branch: B.Sc.(IT)	Semester-III
Subject Code: 3104	Lecture: 04 Credit: 04
Course Opted	Core Course - 10
Subject Title	COMPUTER ORGANISATION AND ARCHITECTURE

Course Objectives:

- To give a basic understanding of concepts and structure of computers.
- To understand the organization of Cache memory and memory management hardware.
- To study the working of different interrupts & Mapping Techniques.
- To study register organization.
- To understand the different addressing modes.
- To demonstrate the working of central processing unit and RISC and CISC Architecture.

Course Outcomes:

- To describe basic structure of the computer system.
- To demonstrate the arithmetic algorithms for solving ALU operations.
- To demonstrate the memory mapping techniques.
- To Identify various types of buses, interrupts and I/O operations in a computer system
- Learn the concepts of parallel processing, pipelining and inter-processor communication.
- Exemplify the I/O and memory organization.

Branch: B.Sc.(IT)	**Semester-IV**
Subject Code: 4101	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course - 11**
Subject Title	**ADVANCED JAVA**

Course Objectives:

- Development of GUI programs using Swing
- Use power of advance Java for building Applications using Database connectivity

Course Outcomes:

- Developing GUI based applications
- Database Connectivity
- Advanced Java such as Servlets, JSP and Java Beans

Branch: B.Sc.(IT)	**Semester-IV**
Subject Code: 4201	**Lecture: 02** **Credit: 02**
Course Opted	**Core Course - 11**
Subject Title	**ADVANCED JAVA LAB**

Course Objectives:

- To write programs using swing.
- To write programs for solving real world problems using java collection frame work.
- To write servlet and JSP programs.
- To write GUI programs using swing controls in Java.
- To impart hands on experience with java programming.

Course Outcomes:

- Able to write programs for solving real world problems using java collection frame work.
- Able to write programs using swing, JSP, JDBC and Servlet.
- Able to write GUI programs using swing controls in Java.

Branch: B.Sc.(IT)	Semester-IV
Subject Code: 4102	Lecture: 04 Credit: 04
Course Opted	Core Course - 12
Subject Title	PYTHON PROGRAMMING

Course Objectives:

- To understand the fundamentals of Python Scripting language
- Learn basic components of Python such as variables, looping and conditional flow controls
- Understand the working of list, tuples and dictionary data types
- Learn python file operations for file handling
- Learn the creating GUI form and designing of GUI applications

Course Outcomes:

- To understand importance of Python scripting language for developers and Data Scientists.
- To learn to install Python IDE, start the Python shell
- To define and implement components of a Python program.
- To learn how to use lists, tuples, and dictionaries in Python programs
- To learn how to use functions
- To implement GUI application and layout management

Branch: B.Sc.(IT)	Semester-IV
Subject Code: 4202	Lecture: 02 Credit: 02
Course Opted	Core Course - 12
Subject Title	PYTHON PROGRAMMING LAB

Course objectives:

- To learn Installation of Python interpreter
- To understand python basic syntax and data types
- To implement variable declarations in Python
- To use control structures
- To learn modules

Course Outcomes:

- Able to use the fundamental Python syntax.
- Able to handle strings and functions.
- Able to write programs using control and conditional structure
- Able to create and run Python programs by utilizing the data structures like lists,
- Able to use dictionaries, tuples and sets.

Branch: B.Sc.(IT)	Semester-IV
Subject Code: 4103	Lecture: 04 Credit: 04
Course Opted	Core Course - 13
Subject Title	DATA WAREHOUSING AND DATA MINING

Course Objectives:

- Understand the necessity of Data Warehousing and its continuous growth.
- Understand Planning and Management of Data Warehouse.
- Understand issues in various Architectural types of Data warehouse.
- Understand the application of various models of Data Warehouse.
- Understand the web-enabled data warehouse and role of data mining

Course Outcomes:

On completion of the course the student will be able to

- Decide the type of Data warehouse to build.
- Perform Requirement gathering and Design suitable architecture for Data warehouse project.
- Design and prepare data for Data warehouse using ETL tools
- Build web-enabled data warehouse
- Analyze and Apply Data Mining techniques on real life applications
- Demonstrate phases in data warehouse development life cycle with Data warehouse project.

Branch: B.Sc.(IT)	Semester-IV
Subject Code: 4104	Lecture: 04 Credit: 04
Course Opted	Core Course – 14
Subject Title	SOFTWARE ENGINEERING

Course Objectives:

- To learn and understand the principles of Software Engineering
- To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements.
- To apply Design and Testing principles to S/W project development.
- To understand project management through life cycle of the project.
- To understand software quality attributes.

Course Outcomes:

- Decide on a process model for a developing a software project
- Classify software applications and identify unique features of various domains

- Design test cases of a software system.
- Understand basics of IT Project management.
- Plan, schedule and execute a project considering the risk management.
- Apply quality attributes in software development life cycle.

Branch: B.Sc.(IT)	Semester-V
Subject Code: 5101	Lecture: 04 Credit: 04
Course Opted	Core Course – 15 (Theory)
Subject Title	MOBILE APPLICATION DEVELOPMENT

Course Objectives:

- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development
- To inculcate working knowledge of Android Studio development tool

Course Outcomes:

At the end of this course, students will be able to:

- Identify various concepts of mobile programming that make it unique from programming for
- other platforms,
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced
- phone features, and
- Deploy applications to the Android marketplace for distribution.

Branch: B.Sc.(IT)	Semester-V
Subject Code: 5201	Lecture: 04 Credit: 04
Course Opted	Core Course – 15 (Practical)
Subject Title	MOBILE APPLICATION DEVELOPMENT -LAB

Course Objectives:

- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development
- To inculcate working knowledge of Android Studio development tool

Course Outcomes:

At the end of this course, students will be able to:

- Identify various concepts of mobile programming that make it unique from

programming for

- other platforms,
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced
- phone features, and
- Deploy applications to the Android marketplace for distribution.

Branch: B.Sc.(IT)	**Semester-V**
Subject Code: 5102	**Lecture: 02** **Credit: 02**
Course Opted	**Core Course – 16**
Subject Title	**INTERNET OF THINGS**

Course objectives:

- To understand general concepts of Internet of Things (IoT)
- To learn and understand the Sensing, Actuation, Networking basics, Communication Protocols
- To understand applications of Internet of Things

Course Outcomes:

After successful completion of this course, student will be able to

- Understand general concepts of Internet of Things (IoT)
- Recognize various devices, sensors and applications
- Analyze various M2M and IoT architectures (Analyze)
- Understand various IOT applications

Branch: B.Sc.(IT)	**Semester-V**
Subject Code: 5103	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course - 17**
Subject Title	**INTERNET SECURITY**

Course Objectives:

- Introducing the arena of Internet security & related concepts to the students.
- To understand various concepts related to data confidentiality.
- To expertise the art of Cryptography & various related techniques.
- To learn implementation of digital signature & digital signature certificate.
- To learn various authentication mechanism.
- To learn about various internet security protocols.
- Learning about firewall, its various configurations & implementation.
- Real world case studies.

Course Outcomes:

- Complete understanding of various threats faced by the Internet and related services.

- Protection against cyber-attacks by implementing various security protocols.
- Understanding nature of various cyber-attacks & developing defences against such attacks.

Branch: B.Sc.(IT)	Semester-V
Subject Code: 5104	Lecture: 02 Credit: 02
Course Opted	Skill Enhancement Course - 3
Subject Title	GREEN COMPUTING

Course Objectives:

- At the end of the course, the students will be able to
- Understand concept of Green IT.
- Necessity of Go Green
- Comprehend Green IT from the perspective of hardware, software, storage, and networking

Course Outcomes:

At the end of the course, the students will be able to

- Create awareness among stakeholders and promote green initiatives in their environments leading to a green movement.
- Acquire knowledge about energy efficiency, IT assets disposal, carbon footprint
- Contribute to eco-friendly environment.

Branch: B.Sc.(IT)	Semester-V
Subject Code: 5105	Lecture: 04 Credit: 04
Course Opted	Discipline Specific Elective - 1
Subject Title	SOFTWARE TESTING

Course objectives:

- To learn objectives of Software Testing
- To understand verification and validation
- To understand different testing methods
- To design test plan and test cases
- To understand text execution with the help of tools

Course Outcome:

After successful course completion students will able to

- Understand software testing life cycle
- Understand defects and its life cycle
- Understand various testing strategies
- Design manual test cases for software
- Execute testing using tools

Branch: B.Sc.(IT)	Semester-V

Subject Code: 5106	Lecture: 04 Credit: 04
Course Opted	Discipline Specific Elective - 2
Subject Title	DIGITAL MARKETING

Course Objectives:

- To understand the concept of Digital Marketing.
- To familiarize students with the specific knowledge in the areas of Digital marketing.
- To understand the concept of E Commerce.
- To learn best practices, tools, and techniques of SEO.
- To understand how to use it for branding and sales.

Course Outcomes:

- Understand emerging trends in digital marketing.
- Understand the importance of conversion and working with digital relationship marketing.
- Explore different modes of Social Media marketing.
- Understand the tools of SEO and SEM.
- Become familiar with the elements of the digital marketing plan

Branch: B.Sc.(IT)	Semester-V
Subject Code: 5107	Lecture: 04 Credit: 04
Course Opted	Discipline Specific Elective - 3
Subject Title	NETWORK PROGRAMMING

Course Objectives:

- To explore protocols that underlie the Internet, such as TCP/IP and UDP/IP
- To learn how Java's core, I/O API handles network input and output
- Discover how the InetAddress class helps Java programs interact with DNS
- To write servers and network clients, using Java's low-level socket classes
- To manage many connections at the same time with the nonblocking I/O
- To locate, identify, and download network resources with Java's URI and URL classes
- Diving deep into the HTTP protocol, including REST, HTTP headers, and cookies

Course Outcomes:

- Understanding concept of establishing client & server connections.
- Learning methods of Locating, identifying, and downloading network resources with Java's URI and URL classes
- Understanding creation of network applications using Java Programming language.

Branch: B.Sc.(IT)	Semester-VI
Subject Code: 6101	Lecture: 04 Credit: 04
Course Opted	Core Course -18
Subject Title	INTELLIGENT PROPERTY RIGHTS AND CYBER LAWS

Course Objectives:

- To make students aware of Intellectual Properties & its various components.
- To make students understand the basic exclusive rights granted by IPR and their legal acquisition.
- To elaborate the concept of Infringement & remedies against IPR infringement.
- To clear the concepts of Licensing & Assignment of IPR.
- Informing students about various International Treaties & obligations.
- Clearing the concepts about law, cyber law & cyber jurisprudence.
- To make students aware of E-commerce, digital contracts & digital signature.
- To make student aware about use of ICT in governance i.e. E-governance.
- To teach IT act 2000 & relevant laws.

Course Outcomes:

- Complete knowledge about different IPs & exclusive rights granted by them.
- Legal remedies in case of IPR infringement.
- Introducing Cyber Jurisprudence.
- Knowledge about Implementation of E-Commerce & E-Governance & relevant laws in India.
- Understanding the menace of cybercrimes & its legal remedies.
- Complete knowledge of IT Act 2000.

Branch: B.Sc.(IT)	**Semester-VI**
Subject Code: 6102	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course -19**
Subject Title	**ENTERPRISE RESOURCE PLANNING**

Course Objectives:

- To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.
- To focus on a strong emphasis upon practice of theory in Applications and Practical oriented approach.
- To develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.
-

Course Outcomes

- Make basic use of Enterprise software, and its role in integrating business functions
- Analyze the strategic options for ERP identification and adoption.
- Design the ERP implementation strategies.
- Create reengineered business processes for successful ERP implementation.

Branch: B.Sc.(IT)	**Semester-VI**
Subject Code: 6103	**Lecture: 04** **Credit: 04**
Course Opted	**Core Course -20**
Subject Title	**ETHICAL HACKING**

Course Objectives:

- To learn system hacking methodology, steganography, steganalysis attacks, and covering tracks to discover system and network vulnerabilities.
- To learn about different types of malwares (Trojan, Virus, worms, etc.), system auditing for malware attacks, malware analysis, and countermeasures.
- Learning Packet sniffing techniques to discover network vulnerabilities and countermeasures to defend sniffing. Social engineering techniques and how to identify theft attacks to audit human level vulnerabilities and suggest social engineering countermeasures.
- To learn DoS/DDoS attack techniques and tools to audit a target and DoS/DdoS countermeasures.
- To learn Session hijacking techniques to discover network-level session management, authentication/authorization, cryptographic weaknesses, and countermeasures.
- To learn about Web server attacks and a comprehensive attack methodology to audit vulnerabilities in web server infrastructure, and countermeasures.

Course Outcomes:

- Better understanding of pitfalls in network & system security.
- Testing network security and its various entities by attacking the target network.
- Network security engineers capable of dealing with real world security threats.

Branch: B.Sc.(IT)	**Semester-VI**
Subject Code: 6104	**Lecture: 04** **Credit: 04**
Course Opted	**Discipline Specific Elective -4**
Subject Title	**MACHINE LEARNING**

Course Objectives

- To introduce various statistical and machine learning concepts and methods.
- To introduce machine learning solutions to regression, classification and clustering problems.
- To evaluate and interpret the results of algorithm.

Learning Outcomes

- Perform end-to-end process of investigating data through a machine learning lens.
- Extract and identify best features of data.
- Evaluate the performance of machine learning algorithms.

Branch: B.Sc.(IT)	**Semester-VI**
Subject Code: 6105	**Lecture: 04** **Credit: 04**
Course Opted	**Discipline Specific Elective -5**

Subject Title	BLOCK CHAIN TECHNOLOGY

Course Objectives :

- Understand how blockchain systems (mainly Bitcoin and Ethereum) works.
- To securely interact with them.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from blockchain technology into their own projects.

Course Outcomes:

- Interact with a blockchain system by sending and reading transactions.
- Evaluate security, privacy, and efficiency of a given blockchain system.
- Students are able to understand design principles of Bitcoin and Ethereum.
- Learn about Bitcoin, Cryptocurrency, Ethereum
- Identify a use case for a Blockchain application

Branch: B.Sc.(IT)	Semester-VI
Subject Code: 6106	Lecture: 04 Credit: 04
Course Opted	Discipline Specific Elective -6
Subject Title	CLOUD COMPUTING

Course Objectives:

- To understand the concepts of Cloud Computing.
- To learn Taxonomy of Virtualization Techniques.
- To learn Cloud Computing Architecture.
- To acquire knowledge on Cloud Application Platform.
- To learn Industry Cloud Platforms.

Course Outcomes:

- Understand the concept of virtualization and how this has enabled the development ofCloud Computing
- Know the fundamentals of cloud, cloud Architectures and types of services in cloud.
- Understand scaling, cloud security and disaster management.
- Design Different Applications in Cloud.
- Explore some important cloud computing driven commercial systems.

Branch: B.Sc.(IT)	Semester-VI
Subject Code: 6201	Lecture: 04 Credit: 04
Course Opted	Core Course – 21
Subject Title	PROJECT

Objective:

The Project work enables students to involve themselves completely to develop their project for solving problems of software industry or any research organization. Doing this will give more exposure to students to handle real life problems of project development. The project covers study of existing system & System Requirements, Analysis, Design and Coding and presentation of result to demonstrate proficiency in the design of research