# Department of BSc IT

**F.Y.B.Sc.I.T**

**Semester – I**

**Course Name: Imperative Programming**

**Course Code: SBTTEC101**

**Course objectives:**

1. The course aims to train the student to the basic concepts of the C-programming language.

2. It aims to train the students to understand the concept of conditional statement, loop, nested loop and break a large problem into smaller parts as a module or function.

3. It aims to train the students to understand the concept of string and be able to use an array.to store multiple pieces of homogeneous data.

4. It aims to train the students to understand the concept of pointer, and use a structure to store multiple pieces of heterogeneous data.

5. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

**Course Outcomes:**

1. Read, understand and trace the execution of programs in C language.

2. Draw flowchart and write the C code for a given algorithm.

3. Implement the concept of control statements, loops, and functions to write a C program.

4. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

5. Implement Programs with structures and union

**Course Name: Digital Electronics**

**Course Code: SBTTEC102**

**Course Objective:**

1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

2. To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits.

3. To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.

4. The course will help in design and analysis of the digital circuit and system

**Course Outcomes:**

1. Gain knowledge between different types of number systems, and their conversions.

2. Design various logic gates and simplify Boolean equations.

3. To design and implement combinational logic & arithmetic circuits.

4. Design various flip flops, conversion from one type of flip-flop to another

5. Design different types of counters and shift registers.

**Course Name: Operating Systems**

**Course Code: SBTTEC103**

**Course Objective**:

1. To understand the services provided by and the design of an operating system.

2. To make aware of different types of Operating System and their services.

3. To understand what a process is and learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.

4. To understand different approaches to memory management.

5. To understand the structure and organization of the file system.

**Course Outcome:**

Through the study of this course, students will gain a comprehensive understanding on the concepts and functions of a modern operating system. Students will be able to:

1. Explain the role of the operating system as a high-level interface to the hardware.

2. Use OS as a resource manager that supports multiprogramming.

3. Understands the different services provided by Operating System at different level.

4. Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.

5. Explain the low-level implementation of CPU dispatch.

**Course Name: Discrete Mathematics**

**Course Code: SBTTEC104**

**COURSE OBJECTIVES:**

1. The course objective is to provide students with an overview of discrete mathematics. To introduce the concepts of mathematical logic and set theory.

2. To introduce the concepts of logic, quantifiers, conditional propositions and Elementary Number Theory.

3. To learn various concepts like Mathematical Induction, sequences and recurrence relations.

4. To demonstrate Relations on Sets, Reflexivity, Symmetry, and Transitivity property. Understanding basic concepts and properties related to Graphs and Trees.

5. To acquire the basic knowledge of Probability Axioms, Conditional Probability, Multiplication rule and Independent Events.

**COURSE OUTCOMES:**

1. To perform the operations associated with sets, functions, and relations. Construct truth tables for expressions involving the logical connectives. Determine if a logical argument is valid or invalid.

2. Construct correct direct and indirect proofs involving elementary number theory. Use a counterexample to show that a proposed statement involving concepts from elementary number theory is false. State and explain the Quotient Remainder Theorem (Division Algorithm).

3. State the Principle of Mathematical Induction. Define and use the terms related to functions. Explain one-to-one, onto functions. Students will be able to solve problems based on each concept.

4. State and explain binary relation, reflexive, symmetric, transitive, equivalence relations. Explain Properties of Graphs, Trees and use graph theory for solving problems.

5. Apply principles of Probability, Permutations to solve various problems

**Course Name: Communication**

**Skills Course Code: SBTTEC105**

**COURSE OBJECTIVES:**

1. The course is intended to emphasize the essential aspects of effective written and verbal communication necessary for professional success. Familiarize students with the basics of Technology-enabled Business Communication.

2. The course is designed to empower students to carry out day to day communication at the work place. To impart adequate understanding of various types of communication to facilitate efficient interpersonal communication. To impart the correct practices and strategies of Effective Business writing.

3. This course is designed to develop the skills of the students in preparing for job search and negotiating their use in GDs and interviews. Helps students in Communicating across Functional Areas. 4. Understanding Ethics in Business Communication and Business Communication Aids.

5. The course is designed to develop competence in communication skills related to production & presentation of messages in multiple formats & understand the importance of body language.

**COURSE OUTCOMES**

1. The students should be able to: Apply Verbal and Non-Verbal Communication Techniques in the Professional Environment. Students will be able to deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints.

2. Demonstrate ability to interpret texts and observe the rules of good writing. Prepare and present effective presentations aided by ICT tools. The student will be able to write an impressive resume and face the interview confidently.

3. The students will be able to apply good Oral Communication Skills for Business purpose like in meetings, conferences, GDs etc.

4. Students will be able to conduct themselves using proper business ethics and will be able to use various Business Communication Aids

5. The student will be able to write impressive official correspondence and also learn to make and give effective presentations.

**Semester – II**

**Course Name: Object Oriented Programming**

**Course Code: SBTTEC201**

**Course objectives:**

1. The objective of the course is to teach the basic concepts and techniques which form the object-oriented programming paradigm.

2. To learn the concept of class and object using C++ and develop classes for simple applications.

3. To learn the concept of Constructors and destructors in C++ program.

4. To learn the concept of function overloading, operator overloading, virtual functions and polymorphism.

5. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming, templates, file handling.

**Course Outcomes:**

1. Creating simple programs using classes and objects in C++.

2. Implement programs using constructors, destructors and operator overloading.

3. Apply fundamental algorithmic problems including polymorphism and virtual function.

4. Implement Object Oriented Programs using the concept of inheritance and exceptional handling.

5. Implement Object Oriented Programs using templates and file handling concepts.

**Course Name: Microprocessor Architecture (A.Y. 2018 -19)**

**Course Code: SBTTEC202**

**COURSE OBJECTIVES:**

1. Students will be able to differentiate between Microprocessor, Microcontroller and Microcomputers and will also learn 8085 architectures.
2. Students will be able to write Assembly Language Programs and will learn about stacks, subroutines and interrupts.
3. Students will be able to distinguish between Counters and Timers and will study about stacks and subroutines.
4. Students will be able to do Code Conversion, BCD Arithmetic, and 16-Bit Data Operations and will learn about Programming Tools and Interrupts
5. Students will be able to gain knowledge about Pentium and Pentium Pro microprocessors

**COURSE OUTCOMES:**

1. Compare Microprocessor and Microcontroller. Explain 8085 architecture.
2. Writing Assembly Language Programs.
3. Distinguish between Counters and Timers.
4. State and explain the code conversions and various data operations.
5. Explain Pentium and Pentium Pro microprocessors

**Course Name: Microprocessor and**

**Microcontroller Course Code: SBTTEC202**

**COURSE OBJECTIVES:**

1. Students will be able to differentiate between Microprocessor, Microcontroller and Microcomputers and will also learn 8085 architectures.

2. Students will be able to write Assembly Language Programs and will learn about stacks, subroutines and interrupts.

3. Students will be able to distinguish between Embedded Systems and General-purpose computer systems and will study various components of embedded system.

4. Students will be able to analyze the characteristics and quality attributes of embedded systems. Also, will learn about Embedded Hardware.

5. Students will be able to explain Real Time Operating System and design and development of embedded system

**COURSE OUTCOMES:**

1. Compare Microprocessor and Microcontroller. Explain 8085 architecture.

2. Writing Assembly Language Programs.

3. Distinguish between Embedded Systems and General-purpose computer systems.

4. State and explain the characteristics, operational and non-operational quality attributes of embedded systems.

5. Explain Real Time Operating System and trends in embedded industry.

**Course Name: Web Programming**

**Course Code: SBTTEC203**

**Course objectives:**

1. Develop the ability to logically plan and develop web pages.

2. Learn to write, test, and debug web pages using HTML and JavaScript.

3. Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.

4. Develop basic programming skills using JavaScript and Angular JS.

5. Become familiar with PHP & MySQL principles that relate to web design and learn how to implement theories into practice.

**Course Outcomes:**

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

1. Describe the concepts of World Wide Web, and the requirements of effective web design.

2. Develop web pages using the HTML and CSS features with different layouts as per need of applications.

3. To construct basic websites using HTML and Cascading Style Sheets.

4. Use the JavaScript to develop the dynamic web pages.

5. Construct simple web pages in PHP and MySQL.

**Course Name: Numerical and Statistical Methods**

**Course Code: SBTTEC204**

**Course Objectives:**

1. To develop the student's ability to deal with numerical and quantitative issues in business

2. To enable the use of statistical, graphical and algebraic techniques wherever relevant.

3. To have a proper understanding of Statistical applications in IT and Research industry.

4. Recover deleted files, hidden files, and temporary information that would be used as proof.

5. To understand the usage of correct tools for forensic investigations.

**Course Outcome:**

Upon successful completion of the course the students will be able to:
Understand the various approaches dealing the data using theory of probability.

1. Develop a framework for estimating and predicting the different sample of data for handling the uncertainties.

2. Understand error, source of error and its effect on any numerical computation and also analyzing the efficiency of any numerical algorithm.

3. Learn how to obtain numerical solution of nonlinear equations using Bisection, Newton – Raphson and Regula – Falsi method iteration methods.

4. Solve system of linear equations numerically using direct and iterative methods.

5. Understand the methods to construct interpolating polynomials with practical exposure

**Course Name: Green Computing**

**Course Code: SBTTEC205**

**Course Objective:**

1. The goal of studying green computing is to attain economic viability and improve the way computing devices are used.

2. Reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime

3. Students learn how to measure computer power usage, minimize power usage, procure sustainable hardware, design green data centers, recycle computer equipment, configure computers to minimize power, use virtualization to reduce the number of servers, and other green technologies.

**Course Outcome:**

1. Listing organizations environmental issues and explain how to measure its carbon footprint.

2. To minimize power usage and maximize cooling needs.

3. To change to change the way we work and to create a paperless environment.

4. To identify recycling methods and hardware considerations.

5. To improve the Technology Infrastructure and analyze the Organizational Check-ups.

**S.Y.B.Sc.I.T**

**Semester – III**

**Course Name: Python Programming**

**Course Code: SBTTEC301**

**Course objectives:**

1. To learn core python scripting elements such as variables, expressions, condition statements, loop and control statements.

2. To learn usage of function and strings in Python.

3. To learn the concept of list, tuple, dictionary, exception and file handling.

4. To get familiar with the topics of regular expressions, classes and objects, multithreaded programming and modules.

5. To learn how to create a GUI application by adding widgets, applying layout management features and connecting the application to a MySQL database.

**Course Outcomes:**

1. Install, debug and run a Python program, define variables, use if, if-else, for, while loops.

2. Explore python function, math functions, recursion, a string as a sequence, string slices, and string operations.

3. Explore python lists, tuples, dictionary, file and exception handling

4. Explore python regular expressions, object-oriented concepts, classes, objects, inheritance, data encapsulation, multithreaded programming, time, date, and random module.

5. Explore GUI applications by adding widgets, creating database applications with MySQL.

**Course Name: Data Structures**

**Course Code: SBTTEC302**

**Course Objective:**

1. Allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs.

2. To provide the knowledge of basic data structures and their implementations.

3. To understand the concept of Dynamic memory management, data types, algorithms, asymptotic analysis and notation.

4. To understand the importance of data structures in context of writing efficient programs.

5. To develop skills to apply appropriate data structures in problem solving.

**Course Outcome:**

Upon Completing the Course, Students will able to:

1. Learn the basic types for data structure, implementation and application.

2. Know the strength and weakness of different data structures.

3. Use the appropriate data structure in context of solution of given problem.

4. Develop programming skills which require for solving given problem.

5. Ability to estimate the algorithmic complexity of simple, non-recursive programs.

6. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

7. Understand the hashing techniques and hash functions.

**Course Name: Computer Networks**

**Course Code: SBTTEC303**

**COURSE OBJECTIVE:**

1. Students will differentiate between topologies, networking devices, OSI and TCP/IP models.

2. Student will be able to identify and describe various techniques for efficient bandwidth utilization under wired and wireless medium.

3. Students will be able to distinguish between various wireless network models.

4. Student will be able to analyze the different networking protocols and IP header formats

5. The student will be able to explain the different acknowledging schemes used in case data loss

**COURSE OUTCOMES:**

1. State the functionality of each layer of OSI model when the data is passed from sender to receiver

2. Compare FDM, TDM and WDM

3. Explain the working of cellular telephony

4. State the reason why ipv6 is more robust than ipv4

5. Describe the difference in TCP and UDP header formats

**Course Name: Database Management Systems**

**Course Code: SBTTEC304**

**COURSE OBJECTIVES:**

1. The main objective of this course is to enable students to learn the fundamental concepts of database management system and design.

2. To emphasize the importance of normalization in databases. Discuss normalization techniques and relational algebra concepts which helps in understanding queries.

3. To demonstrate the use of Integrity constraints. Students will be able to understand and write various advanced queries.

4. Understanding the properties of transaction management and concurrency control methods.

5. Beginning with PL / SQL and learning Control Structures, Cursors, Procedures, Functions, Exceptions Handling and Packages.

**COURSE OUTCOMES:**

1. Explain basic database concepts, data models, Unified Modeling language, schemas and instances. Compare file systems and database management system. Draw entity relationship diagrams using appropriate components.

2. Explain the importance of normalization in databases. Discuss normalization techniques and various types of joins. Explain the use of relational algebra concepts.

3. State and explain the use of Integrity constraints. Write SQL queries involving advanced concepts.

4. State and explain the properties of transaction management and concurrency control methods.

5. Write PL / SQL programs using various Control Structures, Cursors, Procedures, Functions, Exceptions Handling and Packages.

**Course Name: Applied Mathematics (A.Y. 2018-2020)**

**Course Code: SBTTEC305**

**Course objectives:**

1. Apply the knowledge of matrices to solve the problems.
2. Know and to understand various types of numerical methods.
3. Ability to interpret the mathematical results in physical or practical terms for complex numbers.
4. Inculcate the habit of Mathematical Thinking through Indeterminate forms and Taylor series expansion

5. Solve and analyze the Partial derivatives and its application in related field of engineering

**Course Outcomes:**

1. Solve the matrix operations, identify the linear dependence and independence of a vectors.

2. Familiar with the various forms and operations of a complex number.

3. Find the Laplace transform of a function and Inverse Laplace transform of a function using definition also solve ordinary differential equations using Laplace transform

4. Evaluate the multiple integrals in Cartesian, Polar coordinates, change the order of the integral

5. Apply integration methods to calculate the areas and volumes of solids.

6. Evaluate the Beta, Gamma, Differentiation Under integral sign and error functions

**Course Name: Computer Oriented Statistical Techniques**

**Course Code: SBTTEC305**

**Course objectives:**

1. Obtain an intuitive and working understanding of numerical methods for the basic problems of numerical analysis.

2. Formulate and solve linear programming problems and operations with nonlinear expressions.

3. Gain experience in the implementation of numerical methods using a computer. Trace error in these methods and need to analyze and predict it.

4. Provide knowledge of various significant and fundamental concepts to inculcate in the students an adequate understanding of the application of Statistical Methods.

5. Demonstrate the concepts of numerical methods used for different applications

6. Ability to solve basic problems in probability and statistics

**Course Outcomes:**

Students will be able to:

1. Understanding and learning of numerical methods for numerical analysis.

2. Understanding the implementation of numerical methods using a computer.

3. Learning of tracing errors in Numerical methods and analyze and predict it.

4. Learning of application of Statistical methods.

5. Discuss concepts of numerical methods used for different applications.

6. To measure experimental result based on hypothesis using chi square techniques to learn techniques to correlate the relationship between various variable

## Semester – IV

**Course Name: Core Java**

**Course Code: SBTTEC401**

**Course objectives:**

1. To introduce the basic concepts of Java and its data types.

2. To gain knowledge about the control flow statement, iterations and classes in Java.

3. To become familiar with concept of inheritance and packages.

4. To use enumerations, arrays, multithreading, exceptions and byte streams with ease.

5. To study concepts of event handling, abstract window toolkit and layouts.

**Course Outcomes:**

1. Use the syntax and semantics of java programming language and basic concepts of OOP.

2. Implement the use of a variety of basic control structures including selection and repetition; classes and objects.

3. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.

4. Apply the concepts of Array, Multithreading and Exception handling to develop efficient and error free codes.

5. Design event driven GUI and web related applications.

**Course Name: Computer Forensics**

**Course Code: SBTTEC402**

**Course Objectives:**

1. To understand the procedures for identification, preservation, and extraction of electronic evidence, auditing and investigation of network and host system intrusions, analysis and documentation of information gathered.

2. To prepare for all stages of an investigation – planning, detection, initial response and management interaction, investigate various media to collect evidence, report them in a way that would be acceptable in the court of law. Find vulnerabilities and security loopholes that facilitate attackers.

**Course Outcome:**

The degree ensures that graduates will be able to:

1. Conduct digital investigations that conform to accepted professional standards and are based on the investigative process: identification, preservation, examination, analysis, and reporting.

2. Identify and document potential security breaches of computer data that suggest violations of legal, ethical, moral, policy, and/or societal standards.

3. Apply a solid foundational grounding in computer networks, operating systems, file systems, hardware, and mobile devices to digital investigations and to the protection of computer network resources from unauthorized activity.

4. Access and critically evaluate relevant technical and legal information and emerging industry trends.

5. Communicate effectively the results of a computer, network, and/or data forensic analysis verbally, in writing, and in presentations to both technical and lay audiences.

**Course Name: Introduction to embedded systems (A.Y. 2018-2020)**

**Course Code: SBTTEC402**

**Course Objectives:**

1. To introduce the Building Blocks of Embedded System

2. To Educate in Various microcontrollers used in Embedded Development

3. To Introduce Bus Communication in processors, Input/output interfacing.

4. To impart knowledge in sensors and actuators.

5. To familiar with the real-world application development using embedded system

**Course Outcomes:**

1. Differentiate between general purpose and embedded systems

2. Discuss the characteristics and quality attributes of embedded systems

3. Use different types of sensors for appropriately

4. Design and develop embedded systems

**Course Name: Artificial Intelligence**

**Course Code: SBTTEC403**

**Course objectives:**

1. To present an overview of artificial intelligence (AI) principles and approaches with comprehensive and in-depth knowledge of AI principles and techniques by introducing AI's fundamental problems, and the state-of-the-art models and algorithms used to undertake these problems.

2. Gain a historical perspective of AI and its foundations.

3. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning. Hours Marks

**Course Outcome:**

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

3. To analyze the structures and algorithms of a selection of techniques related to searching, reasoning, machine learning, and language processing.

4. To define and analyze first order logic

5. To define planning algorithms and categorize knowledge representation

**Course Name: Software Engineering (A.Y. 2018-2020)**

**Course Code: SBTTEC404**

**COURSE OBJECTIVES**

1. To get deep understanding of various process models used in software development

2. To be able to determine the complexity of the system based on the type of the application

3. To be able to relate/map the quality activities with that of the process model

4. To be able to calculate the cost of a project depending on the various associated factors

5. To analyze the reusability, process improvement, distributed engineering concepts

**Course Outcomes:**

1. Why is Spiral Model used in complex projects? Justify your answer with its process activities.

2. Describe critical system with an example. State the dependability attributes in brief.

3. How is project scheduling and risk management interrelated? Explain.

4. Describe the factors effecting the software productivity

5. What are the different levels elaborated in CMMI

**Course Name: IT Service Management**

**Course Code: SBTTEC404**

**COURSE OBJECTIVES**

1. Student will be able to identify and illustrate basic terminology and concepts of ITSM.

2. Students will be able to describe the functions, roles and processes for each of the phases of the ITIL Service Lifecycle.

3. Apply a service-oriented approach to business systems design and operations in order that an organization is more efficient and effective.

4. State the activities under taken in service operation/explain, analyze, and critique the concept of IT Service Management taking an example.

5. Student will be able to identify the importance of process improvement and would be able to state the various steps in it.

**COURSE OUTCOMES**

1. Describe the importance of service management and associated 4p's giving example.

2. Describe using suitable example the ITIL service lifecycle

3. State the activities undertaken in service design of an application.

4. State the process of incident reporting

5. taking a suitable example explain RACI model

**Course Name: Computer Graphics and Animation**

**Course Code: SBTTEC405**

**Course objectives:**

1. To learn the fundamentals of computer graphics and scan conversion algorithms.

2. To learn Geometrical Transformations in 2-Dimensional and 3-Dimensional perspectives.

3. To learn stages in 3D viewing, Canonical View Volume, Radiometry, Colorimetry, Color Spaces, Color Appearance

4. To learn visible-surface determination algorithms, Curve Representation, Bezier Curves, B-spline Curves.

5. To learn Principles of Animation, Key framing, Image, Digital image file formats, Image compression standard

**Course Outcomes:**

1. Explore the structure of an interactive computer graphics system, and the separation of system components.

2. Apply the concept of 2D and 3D geometrical transformations.

3. Implement the knowledge of viewing in 3D, Canonical View Volume, Radiometry, Photometry.

4. Get familiar with Visible-Surface Determination algorithm and Curve Representation.

5. Get accustomed to Principles of Animation, Image Manipulation and Storage.

**T.Y.B.Sc.I.T**

**Semester – V**

**Course Name: Software Project Management**

**Course Code: SBTTEC501**

**COURSE OBJECTIVE**

1. To provide idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases.

2. To provide an idea of using various process models in the software industry according to given circumstances.

3. To learn the various aspects of cost considered by the organization while handling multiple projects

4. To Describe the various methodologies used in testing and to brief about the various cost models.

5. To emphasize the importance of quality assurance and brief with the reasons for which the projects fail.

**COURSE OUTCOMES:**

1. Students will be able to decompose the given project in various phases of a lifecycle.

2. Students will be able to choose appropriate process models depending on the user requirements.

3. What is net profit and IRR? Explain by giving an example.

4. Compare static and dynamic testing.

5. Describe metrics for measuring software quality

**Course Name: Internet of Things**

**Course Code: SBTTEC502**

**COURSE OBJECTIVE:**

1. Student will be able to describe the basic equation of IoT and define its relation with ubiquitous computing.

2. Student will be able to recognize the characteristics of different board used in prototyping.

3. Student will be able to describe and differentiate between the various methods used for physical design prototyping and software prototyping.

4. The student will be able to identify the purpose of business model canvas and would be able to propose one.

5. Discover the importance of security while prototyping and will be able to identify various funding methods for scaling up the production of prototype.

Course outcomes

1. State examples IoT device show each component of equation in the stated example comprehension application

2. Differentiate between arduino rasberrypi and beaglebone black

3. Explain the methods of software prototyping with its advantages

4. Construct a business model canvas taking a suitable example

5. Explain the factors on deciding which funding methodology to use for mass production

**Course name: ADVANCED WEB PROGRAMMING**

**Course code: SBTTEC503**

**Course objective:**

1. To explore .net technologies for designing and developing dynamic, interactive and responsive web applications.

2. Provide a consistent, object-oriented programming environment whether object code is stored and executed locally, executed locally but web distributed, or executed remotely.

3. Make the Developer Experience Consistent Across Widely Varying Types of Apps, Such As Windows Based Apps and Web-Based Apps.

4. Proficiently Develop ASP.NET Web Applications Using C#.

5. Building multi-tier enterprise applications.

**Course Outcome:**

Through the study of this course, students will gain a comprehensive understanding on the concepts and function of .NET Framework and ASP.NET Technology. Students will be able to:

1. Understand the .NET framework.

2. Develop a proficiency in the C# programming language.

3. Proficiently develop ASP.NET web applications using C#.

4. Use ADO.NET for data persistence in a web application.

5. To understand the 3-tier software architecture (presentation/client tier, application tier, data tier) and develop multi-tier applications to understand and experiment with the deployment of enterprise application.

**Course Name: Linux System Administration**

**Course Code: SBTTEC504**

**Course objectives:**

1. The course objective is to analyze fundamentals of the Linux operating system, including installation, configuration, administration, file management, and security.

2. Students will learn to operate running Linux systems by managing the boot process, scheduling jobs, updating the system, monitoring system performance and managing security.

**Course Outcome:**

1. To create basic filesystem and manage system administration task

2. To create partitions and configure the network manager

3. To manage users, groups and permissions.

4. To setup firewalls and cryptographic services.

5. To configure DNS, mail & Apache server

**Course Name: Enterprise Java**

**Course Code: SBTTEC505**

**Course objectives:**

1. To gain knowledge about Enterprise Application, Java EE Technologies, Java EE Architecture, Server and Containers, Servlet Technology

2. To learn the concept of Request Dispatcher, Cookies, Sessions, Non-Blocking I/O

3. To learn the concept of Java Server Page, JSP Action Elements and Implicit Objects, JSTL.

4. To learn the concept of Enterprise JavaBeans, Session Beans, Message Driven Beans, Java Naming and Directory Interface

5. To learn the concept Persistence, Object/Relational Mapping and JPA, Hibernate, Writing Hibernate Application.

**Course Outcomes:**

1. Create dynamic web pages using Servlets, Databases application with servlet.

2. Apply the concepts of Request Dispatcher, Cookies, Session, Working with Non-Blocking I/O with servlet.

3. Create dynamic web pages using Java Server Pages.

4. Make a reusable software component, using Java Bean.

5. Map Java classes and object associations to relational database tables with Hibernate mapping files

**Semester – VI**

**Course Name: Software Quality Assurance**

**Course Code: SBTTEC601**

**Course objectives:**

1. To brief different concepts related to quality of a project and process.
2. To describe the testing process challenges and the cost of testing.
3. To brief various testing methodology
4. To describe the concepts related to verification and validation
5. To explore various testing strategies depending on the system in use

**Course outcomes:**

1. What is continuous improvement quality cycle.
2. Describe traceability matrix giving an example.
3. Compare the white box and Black box strategies used in testing.
4. For an attendance application developed, state various V&V activities undertaken
5. Compare web application testing and mobile application testing

**Course Name: Security in Computing**

**Course Code: SBTTEC602**

**Course objectives:**

1. The main objective of this course is to enable students to learn the Importance of Information Protection and study how to build a security program.
2. Students will be able to distinguish between Authentication and Authorization. Introduction to cryptography.
3. To acquire basic knowledge of Secure Network Design, Firewalls and Wireless Network Security.
4. Students will be able to explain the Intrusion Detection and Prevention Systems. Will learn overview of Operating System Security Models.
5. Understanding Virtual Machines, Cloud Computing and Physical Security concepts along with learning how to Secure Application Design.

**COURSE OUTCOMES:**

1. State and explain the Importance of Information Protection. Define CIA triad.
2. Explain the importance of Authentication and Authorization. Discuss Encryption in

brief. Explain General Database and Storage Security Concepts

3. State Network Device and wireless security measures and Explain Firewalls.

4. State and explain the features of Intrusion detection and Security Information and Event Management. Explain VoIP Vulnerabilities and Countermeasures.

5. State and explain Virtual Machines and Cloud Computing concept in detail. Explain Secure Development Lifecycle

**Course Name: Business Intelligence Course**

**Code: SBTTEC603**

**Course Objectives:**

1. To introduce students with concepts of business intelligence by creating a background of data warehousing and data mining.

2. The entire purpose of Business Intelligence is to support and facilitate better business decisions.

3. BI allows organizations access to information that is critical to the success of multiple areas including sales, finance, marketing, and a multitude of other areas and departments.

4. Identify the technological architecture that makes up BI systems

**Course Outcomes:**

1. Define Business intelligence architectures and Ethics

2. Critically evaluate use of BI for supporting decision making in an organization

3. Evaluate classification models

4. To design business intelligence applications

5. To construct an expert system

**Course Name: Data Science**

**Course Code: SBTTEC604**

**Course Objectives:**

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods
2. Employ efficient storage and data operations using NumPy arrays.
3. Do data pre-processing and visualization using Pandas
4. Gain practical, hands-on experience with statistics programming languages and big data tools through coursework and applied research experiences.

**COURSE OUTCOMES:**

1. Define Data science framework
2. Classifying the management layers
3. Understanding functionality of Numpy and Pandas
4. Designing Plotting with Pandas
5. Plan the implementation of a BI system Hours Marks

**Course Name: Ethical Hacking (A.Y. 2018-2021)**

**Course Code: SBTTEC604**

**Course Objectives:**

1. To understand the procedures for identification, preservation, and extraction of electronic evidence
2. To prepare for all stages of an investigation – planning, detection, initial response and management interaction,
3. To understand the procedures for auditing and investigation of network and host system intrusions, analysis and documentation of information gathered.
4. To prepare for investigation of various media to collect evidence, report them in a way that would be acceptable in the court of law.
5. To Find vulnerabilities and security loopholes that facilitate attackers

**COURSE OUTCOMES:**

1. Conduct digital investigations that conform to accepted professional standards and arebased on the investigative process:
2. Identify and document potential security breaches of computer data that suggestviolations of legal, ethical, moral, policy, and/or societal standards;
3. Identification, preservation, examination, analysis, and reporting;

**Course Name: Project Course**

**Code: SBTTEC605 Course**

**Objectives:**

- Describe the Systems Development Life Cycle (SDLC).
- Evaluate systems requirements.
- Complete a problem definition.
- Evaluate a problem definition.
- Determine how to collect information to determine requirements.
- Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time feasibility and Operational feasibility for the project.

- Work on data collection methods for fact finding.
- Construct and evaluate data flow diagrams.
- Construct and evaluate data dictionaries.
- Evaluate methods of process description to include structured English, decision tables and decision trees.
- Evaluate alternative tools for the analysis process.
- Create and evaluate such alternative graphical tools as systems flow charts and state transition diagrams.
- Decide the S/W requirement specifications and H/W requirement specifications.
- Plan the systems design phase of the SDLC.
- Distinguish between logical and physical design requirements design and evaluate system outputs.
- Design and evaluate systems inputs.
- Design and evaluate validity check for input data.
- Design and evaluate user interfaces for input.
- Design and evaluate file structures to include the use of indexes.
- Estimate storage requirements.
- Explain the various file update processes based on the standard file organizations.
- Decide various data structures.
- Construct and evaluate entity-relationship (ER) diagrams for RDBMS related projects.
- Perform normalization for the normalized tables for RDBMS related projects
- Decide the various processing systems to include distributed, client/server, online and others. Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts. Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Systems implementation and its key problems.
- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.
- Decide the various processing systems to include distributed, client/server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts. Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Work effectively as an individual or as a team member to produce correct, efficient, well-organized and documented programs in a reasonable time.
- Recognize problems that are amenable to computer solutions, and knowledge of the tool necessary for solving such problems.
- Develop of the ability to assess the implications of work performed.
- Get good exposure and command in one or more application areas and on the software

- Develop quality software using the software engineering principles
- Develop of the ability to communicate effectively