



Karmaveer Bhaurao Patil University, Satara
Yashwantrao Chavan Institute of Science, Satara



B. Sc. (Computer Science)

Programme and Credit Structure as per NEP 2020

{Ref. Government of Maharashtra letter no. एनडीपी.२०२२/ए.क.०९/विशि-इशि का ना दिनांक: १३ मार्च
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The degree shall be titled as 'Bachelor of Science [Computer Science] under the faculty of Science and

Technology

- B. Sc. Sem. I & II from Academic Year 2024-25**
- B. Sc. Sem. III & IV from Academic Year 2025-26**
- B. Sc. Sem. V & VI from Academic Year 2026-27**
- B. Sc. Sem. VII&VIII from Academic Year 2027-28**

Programme Outcomes for B. Sc. (Computer Science)

PO. No.	Programme Outcomes
	After completing B. Sc. (Computer Science) Programme the students will be able to.....
PO-1	Foundational Knowledge: Graduates should demonstrate a strong understanding of the foundational principles, theories, and concepts in computer science, including algorithms, datastructures, programming languages, and computer architecture.
PO-2	Problem Solving: Graduates should be able to analyze complex problems, identify potential solutions, and apply algorithmic and computational techniques to develop effective solutions.
PO-3	Programming Proficiency: Graduates should be proficient in programming languages commonly used in the field of computer science, with the ability to design, implement, test, and debug software applications.
PO-4	Software Development: Graduates should be able to apply software engineering principles and practices to effectively develop, deploy, and maintain software systems, adhering to industry standards and best practices.
PO-5	Database Management: Graduates should be competent in database design, implementation, and management, with the ability to use database management systems to store, retrieve, and manipulate data efficiently.
PO-6	Computer Networking: Graduates should understand the fundamentals of computer networking, including network architecture, protocols, and security, and be able to design and configure network systems to meet organizational needs.
PO-7	Operating Systems: Graduates should have a solid understanding of operating systems concepts, including process management, memory management, file systems, and be able to work with different operating systems.
PO-8	Web Development: Graduates should be proficient in web development technologies and frameworks, with the ability to design and develop dynamic and interactive web applications.
PO-9	Software Testing and Quality Assurance: Graduates should understand the principles of software testing and quality assurance and be able to design and implement testing strategies to ensure the reliability and quality of software systems.
PO-10	Cybersecurity Awareness: Graduates should be aware of cybersecurity threats and vulnerabilities, understand security measures and protocols, and be able to implement security controls to protect computer systems and data.
PO-11	Ethical and Professional Responsibility: Graduates should understand the ethical and legal issues related to computer science, including privacy, intellectual property, and cybercrime, and demonstrate ethical and professional behaviour in their work.



PO-12	Communication and Collaboration: Graduates should possess strong communication and collaboration skills, both verbal and written, and be able to work effectively in multidisciplinary teams to solve complex problems.
PSO- NO	Programme Specific Outcomes The student will be able to...
PSO-1	Proficiency in Programming: Graduates should demonstrate proficiency in programming languages such as Java, Python, C/C++, and others, with the ability to develop, debug, and maintain software applications.
PSO-2	Problem-Solving Skills: Graduates should possess strong problem-solving skills and be able to apply computational thinking to analyze and solve complex problems in diverse domains.
PSO-3	Understanding of Algorithms and Data Structures: Graduates should have a solid understanding of fundamental algorithms and data structures, including their design, analysis, and implementation, to efficiently solve computational problems.
PSO-4	Software Development Lifecycle: Graduates should be familiar with the software development lifecycle, including requirements analysis, design, implementation, testing, deployment, and maintenance, and be able to apply relevant methodologies and best practices.
PSO-5	Database Management: Graduates should have knowledge of database management systems (DBMS) and be able to design, implement, and manage databases, as well as write complex SQL queries for data retrieval and manipulation.
PSO-6	Web Development Skills: Graduates should be proficient in web development technologies such as HTML, CSS, JavaScript, and web frameworks, and be able to develop interactive and dynamic web applications.
PSO-7	Computer Networking: Graduates should understand the principles of computer networks, including network architecture, protocols, security, and be able to design and configure network systems.
PSO-8	Operating Systems: Graduates should have a deep understanding of operating systems concepts, including process management, memory management, file systems, and be able to work with different operating systems.
PSO-9	Software Engineering Principles: Graduates should understand software engineering principles and practices, including software design patterns, software testing, version control, and be able to work effectively in a team-based development environment.
PSO- 10	Cybersecurity Awareness: Graduates should be aware of cybersecurity threats and vulnerabilities, understand security measures and protocols, and be able to implement security controls to protect computer systems and data.
PSO- 11	Ethical and Professional Responsibility: Graduates should understand the ethical and legal issues related to computer science, including privacy, intellectual property, and cybercrime, and demonstrate professional responsibility in their work.
PSO- 12	Communication and Presentation Skills: Graduates should possess strong communication and presentation skills, both verbal and written, and be able to effectively communicate technical concepts to diverse audiences.

SEMESTER -I



Theory: BCST111: C Programming I

Learning Objectives:

1. To impart adequate knowledge on the need of programming languages.
2. To evaluate the need of problem solving techniques.
3. To develop programming skills using the fundamentals and basics of C Language.
4. To learn to write algorithms and flowchart of programs in C and to solve the problems.

Learning Outcomes:

At the end of this course, students are able to:

1. Learn algorithm writing and flowchart drawing.
2. Understand the compilation process and execution of any C Program.
3. Write simple programs using C language and will help them to develop programming logic.
4. Understand the use of Arrays to solve in real life applications.

Theory : BCST112: Database Management Systems Learning Objectives:

1. To learn fundamental concepts of data.
2. To evaluate principles of databases.
3. To create database management operation.
4. To adapt the concept of procedure oriented, object oriented programming languages, Database Management.

Learning Outcomes:-

At the end of this course, students are able to:

1. Understand basics of different database models for software development.
2. Identify the basic concepts and various data model used in database design
3. Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression for queries.
4. Identify the purpose of query processing and optimization and also demonstrate the basic of query evaluation.

Practical-I

BCSP113: Lab Course I (C Programming I and Database Management Systems)

Learning Objectives:

1. To understand computer programming and its roles in problem solving.
2. To remember and develop well-structured programs using C language.
3. To develop programming skills using the fundamentals and basics of C Language.
4. To learn the student to write algorithms and flowchart of programs in C and to solve the problems.
5. To learn database management operation.

Learning Outcomes:-

At the end of this course, students are able to:

1. Student should learn which software's are available for C Programming and how to use the Editor for writing Program and how to execute it.
2. Student should write algorithms, flowcharts and programs on operators, Conditional Branching, Looping, Functions and Arrays.
3. Programming in C should increase the programming logic of Students.
4. Student should learn which software's are available for RDBMS and how to use the Editor for writing query and how to execute it.
5. Formulate query, using SQL, solutions to a broad range of query and data update problems.

Theory: BCST114: Fundamental of Electronics and Network Analysis Course

Objectives: Students should be able to ...

1. To learn the fundamentals of electronic circuits.
2. To study and verify different and theorems
3. To summarize Two Port Networks.
4. To understand dc and ac circuits.



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Course Outcome: Students will be able to...

- 1 Identify active and passive components and understand basic circuit theory
- 2 Evaluate mesh and nodal analysis of ac and dc circuits.
- 3 Solve & minimize complex electronic circuits.
- 4 Design a resonance circuit.

Theory: BCST115: Digital Electronics-I

Course Objectives: Students should be able to...

- 1 To learn and verify various number systems.
- 2 To study logic gates and Boolean algebra.
- 3 To classify different logic families.
- 4 To understand the concept of combinational logic circuits.

Course Outcomes: The students will be able to...

- 1 Solve the problems related to interconversion of number system and design
- 2 Develop logic circuits using logic gates and Boolean algebra.
- 3 Analyze different logic families.
- 4 Design combinational logic circuits.

Practical I:

BCSP116 Objectives: Students should be able to...

- 1 Identify basic electronics components and circuits.
- 2 Verify different laws and theorem for solving complex circuit to simplified circuit
- 3 Simplify the expressions using Boolean algebra and Learn logic gates.
- 4 Construct sequential and combinational logic circuits.

Course Outcome: Students will be able to...

- 1 Utilize basic electronics components and circuits.
- 2 Apply the basic theory & mathematical relationships in electronic circuits.
- 3 Design, construct and verify logic circuits.
- 4 Develop combinational and sequential logic circuits

Syllabus – DSC III

Theory: BCST 117: Discrete Mathematics

Course Objectives: Students will be able to

- 1 To develop a foundational understanding of key mathematical concepts including logic, divisibility in integers, counting principles, and relations.
- 2 To apply logical reasoning, solve problems related to integer divisibility, utilize counting techniques.
- 3 To analyze and solve combinatorial problems.
- 4 To understand and apply various types of relations in mathematical contexts.

Course Outcomes: At the end of this course, students should be able to:

- 1 Understand logic.
- 2 To solve the divisibility rules, govern by integers.
- 3 Choose and apply counting principles.
- 4 Impart Relations and their Types.

Syllabus – DSC III

B. Sc. I – Semester – I

Theory: Paper VI: BCST 118: Descriptive Statistics I

Course Objectives: Students will be able to

- 1 To introduce the technique of data collection & its presentation.
- 2 To compute various measures of central tendencies, dispersion, moments, skewness, kurtosis and to interpret them.
- 3 To introduce concept of correction coefficient and how to interpret its value.
- 4 To establish relationship between two or more variables and predict the value by Regression analysis.

Course Outcomes: At the end of this course, students should be able to:

- 1 Learn data condensation and visualization.
- 2 Compute Measure of central tendency and Measure of Dispersion.

3. Acquire Knowledge about the correlation.
4. Understand Linear regression analysis



Practical I

Lab Course II: BCSP 119 (Based on BCST 117 and BCST 118)

Course Objectives: students will be able to:

1. To solve and analyze recurrence relations and combinatorial arguments, validate logical arguments using truth tables and laws of inference and demonstrate equivalence relations through practical examples.
2. To implement Euclid's algorithm and the division algorithm to solve problems in number theory, apply Fermat's theorem for arithmetic problems and use Warshall's algorithms to shortest paths in graphs
3. To represent statistical data and evaluate various measures of central tendency.
4. To compute Dispersion, moments, Skewness, kurtosis, correlation and predict the value using Regression.

Course Outcomes: Students are able to

1. Understanding Recurrence Relations, Euclid's Algorithm and Division Algorithm.
2. Perform Fermat's Algorithm and Warshall's Algorithm.
3. Learn data condensation and visualization and compute measure of central tendency and measure of dispersion.
4. Acquire Knowledge about the correlation and understand Linear regression analysis.

SEMESTER-II

Syllabus DSC– I

Theory: BCST121: C Programming-II

Course Objectives: - Students should be able to...

1. To define a programming logic.
2. To learn advanced concepts of c language.
3. To understand skills for writing complex programs using 'C'.
4. To describe and develop well-structured programs using C language

Course Outcomes: - Students will be able to...

1. Interpret the concept of pointers, declarations, initialization, operations on pointers and their usage.
2. Evaluate union and enumeration user defined data types.
3. Apply functional hierarchical code organization.
4. Analyze File handling mechanism, functions and create files at runtime.

Theory: BCST122

Relational Database Management Systems

Learning Objectives:

1. To remember the concept of normalization.
2. To learn the transaction processing.
3. To understand File Structure and Indexing.
4. To evaluate the knowledge of RDBMS into real life data and to learn the different types of SQL queries performed on data.

Learning Outcomes:-

At the end of this course, students are able to:

1. Students should understand concepts of database Schema, Normalization and relational mapping.
2. Understand database concepts and file structures and query language.
3. Write the SQL queries for joining tables, sub query, PL/SQL Programs, Cursor Triggers etc.
4. Evaluate the concept of Transaction management, deadlocks and concurrency control.

Practical-II

BCSP123: Lab Course II(C Programming – II and Relational Database Management Systems)

Learning Objectives:

1. To learn advanced concepts of c language.
2. To develop skills for writing complex programs using 'C'.
3. To understand and develop well-structured programs using C language
4. To analyze concept of normalization, Transaction Processing and to learn File Structure and Indexing.
5. To design the different types of SQL queries performed on data.



Learning Outcomes:-

At the end of this course, students are able to:

1. Solve programs on basics of pointer, Structure and Union, File Handling, C Preprocessor.
2. Due to program writing student will acquire the program writing skill, technical skill.
3. Programming in C should increase the file programming logic of Students.
4. Student should understand how to implement theoretical knowledge of SQL into SQL queries.
5. Student should write queries for any application software and able to handle database.
6. Due to query writing student will acquire the Relational Database Management skill, Concurrency Control mechanism.

Theory: BCST124: Semiconductor Devices Course Objectives: Students should be able to

1. To learn the basics of a semiconductor materials
2. To interpret rectifiers and regulators.
3. To understand the basics of transistors and various configurations.
4. To explain the field effect transistor.

Course Outcome: Students will be able to...

- 1 Verify and interpret basics of semiconductor materials
- 2 Inspect rectifiers and regulators.
- 3 Analyze and interpret the characteristics of transistors
- 4 Determine characteristics and performance of field effect transistor.

BCST 125: Digital Electronics-II

Course Objectives: Students should be able to ...

1. To learn sequential logic circuits.
2. To study counter circuits.
3. To understand the concept of Shift register and Programmable Logic Device.
4. To explain computer memory organization.

Course Outcomes: The students will be able to...

- 1 Design sequential logic circuits
- 2 Develop a counter circuit.
- 3 Demonstrate shift register circuit.
- 4 Describe computer memory organization.

BCSP 126: (Based on BET124 & BET125)

Course Objectives: Students should be able to...

1. To learn half wave and full wave rectifier circuits.
2. To study fixed and variable IC regulators.
3. To understand Flip-flop circuits.
4. To contrast the counter and shift register circuit.

Course Outcome: Students will be able to...

- 1 Design and verify half wave and full wave rectifier circuit.
- 2 Develop fixed and variable ic regulators.
- 3 Construct flip flop circuits.
- 4 Utilize the counter and shift register circuit.

Theory: BCST 127: Graph Theory

Course Objectives: Students will be able to

1. To provide a comprehensive understanding of graph theory.
2. To study of graphs, operations on graphs, connected graphs, and trees.
3. To analyze and manipulate various types of graphs, understand the properties and applications of connected graphs.
4. To explore the fundamental concepts of trees in graph theory.

Course Outcomes: At the end of this course, students should be able to:

1. Understanding Graph, Subgraph and Operation on Graphs.
2. Analyze concepts of Connected graph and Trees.
3. Learn to apply concepts of algorithms of graphs.
4. Performing algorithms like Dijkstra, Kruskal.



Theory: BCST 128: Probability and Probability Distribution

Course Objectives: Students will be able to

1. To introduce students to concept of probability, univariate probability distribution.
 2. To compute probabilities of different events, conditional distribution.
 3. To introduce students with standard discrete probability distributions and bivariate probability distributions.
 4. To understand use of discrete probability distributions in different situations
- Course Outcomes:** At the end of this course, students should be able to....
1. Know probability, types of events and conditional probability.
 2. Understand probability mass function, cumulative distribution function.
 3. Evaluate expectation of random variable.
 4. Understand various univariate probability distribution.

Lab Course II: BCSP 129: (Based on BCST 127 and BCST 128)

Course Objectives: students will be able to:

1. To explore graphs and isomorphisms, perform operations on graphs such as union, intersection, complement, and self-complement and utilize matrix representations of graphs.
2. To calculate key graph properties, implement dijkstra's shortest path algorithm to find optimal paths and apply kruskal's algorithm to find minimum spanning trees.
3. To compute probabilities of different events, conditional distribution.
4. To understand use of discrete probability distributions in different situations.

Course Outcomes: Students are able to...

1. Learn various types of graphs, operations on graph and matrix representation of graphs.
2. Understanding Network Algorithm like Kruskal's, Dijkstra.
3. Evaluate probability and conditional probability
4. Understand applications of various univariate probability distribution.

SEMESTER – III

BCST231: Data Structures using C

Course Objectives: Student will be able to

1. To understand the basic concepts such as linear and non linear data structures.
2. To apply the notations used to analyze the performance of algorithms.
3. To imbibe the behavior of data structures such as stacks queues and their representations.
4. To study an appropriate data structure for a specified application and to understand and analyze various algorithms.

Course outcomes-Students should be able to

1. Understand the fundamentals of c and ability to choose appropriate data structures to represent data items in real world problems.
2. Analyze the different types of stack notations.
3. Design programs using a variety of data structures such as stacks, queues.
4. Demonstrate various kinds of linked list.

BCST232: Computational Mathematics

Course Objectives: Students will be able to

1. To understand types of matrices and their applications, develop the skills find the Eigen values and eigenvectors.
2. To impart adequate knowledge concept of graphs, and apply graph algorithms.
3. To choose and apply appropriate numerical techniques.
4. To solve the problem and interpret the result.

Course Outcomes:

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

1. Solve the system of equations using the language of Matrices and elementary concepts of Matrices.
2. Analyze concepts of Graph and types of graphs and apply concepts of algorithms of graphs.
3. Learn various methods of numerical differentiation and integration.
4. Choose appropriate numerical methods and determine the solutions to differential equations.



BCSP 233: Lab Course (Data Structures using C)

Course Objectives: Student will be able to

1. To understand the basic concepts such as linear and non-linear data structures.
2. To apply the notations used to analyze the performance of algorithms.
3. To imbibe the behavior of data structures such as stacks queues and their representations.
4. To study an appropriate data structure for a specified application and to understand and analyze various algorithms.

Course outcomes-Students should be able to

1. Prepare and perform an installation of Windows Server 2008 and identify the various types of file Systems and their components.
2. Identify Active Directory logical components and infrastructure, create and manage file System access security.
3. Learn the fundamentals of c and ability to choose appropriate data structures to represent data items in real world problems.
4. Analyze the time and space complexities of algorithms.

BCST 234: Lab Course (Computational Mathematics)

Course Objectives: students will be able to:

1. To understand how matrices and determinants are used as mathematical tools in qa and determining the inverse of matrix.
2. To study the applications of graph algorithm and representation of mathematical expression in polish notation.
3. To understand how numerical methods are used as mathematical tools and determining the results.
4. To study and implement c-programs of numerical integration methods.

Course Outcomes: Students able to

1. Critically analyze and construct Mathematical arguments that relate to the study of introductory Matrix theory.
2. Analyze various graph algorithms and represent mathematical expression in Arborescence and Polish notation.
3. Learn various methods of numerical differentiation and integration.
4. Learn implementation of numerical methods through C-programming.

BET 235: Wave-Shaping Circuits and Timer IC

Course Objectives: Student will able to...

1. To understand linear wave shaping circuits
2. To explore nonlinear wave shaping techniques
3. To investigate transistor switching circuits
4. To Study sweep generators and timer ICS

Course Outcomes: The students should be able to...

1. Apply Knowledge of Linear Wave Shaping
2. Implement Nonlinear Wave Shaping Techniques
3. Design and Analyze Transistor Switching Circuits
4. Implement and Utilize Timer IC applications

Lab I: BEP236: Wave-Shaping Circuits and Timer IC Lab (Hardware)

Course Objectives: Student will able to...

1. To understand Fundamental Concepts of RC Circuits
2. To study Nonlinear Circuit Techniques
3. To examine Transistor Characteristics and Multivibrators.
4. To study Timer IC Applications and Modulation Techniques

Course Outcomes: The students should be able to...

1. Apply Fundamental Concepts of RC Circuits
2. Explore Nonlinear Circuit Techniques
3. Investigate Transistor Characteristics and Multivibrators.
4. Design and Explain working of Timer IC 555 application.

Lab Course on BCSPVSC 1: Object Oriented Programming using C++

Course Objectives: students will be able to:

1. To reinforce theory with hands-on learning.
2. To develop strong coding skills.
3. To learn debugging and error handling.
4. To deepen understanding of algorithms.
5. To prepare for Real Software Development.

Course Outcomes: students will be able to:



1. Gaining hands-on programming experience.
2. Improving problem-solving abilities.
3. Mastering C++ syntax and language features.
4. Developing debugging and testing skills, and gaining confidence in applying theoretical knowledge to real-world scenarios.

BCSPSEC 2: Lab Course: System Analysis Design

Course objectives: Student will be able to

1. To broaden their knowledge of software engineering.
2. To learn software testing algorithms and programs.
3. To provide the knowledge of dot net frameworks along with c#
4. To analyse object-oriented paradigm in the C # programming language

Course outcomes-Students should be able

1. Learn how to design and program Python applications.
2. Implement database and GUI applications.
3. Use the features of Dot Net Framework along with the features of C#.
4. Develop correct, well-documented programs using the C# programming Language.

BCSTVEC 1: Computer Science for Environmental Awareness

Course Objective: Student should be able to

1. To understand the environmental impact of computing technologies and their life cycle assessments.
2. To develop skills in sustainable software engineering and green coding practices to minimize resource consumption.
3. To analyze global environmental policies and ethical considerations relevant to the tech industry.
4. To apply knowledge to assess and mitigate the environmental footprint of digital products and datacenters.
5. To explore opportunities for innovation and leadership in environmental sustainability within the field of computer science.

Course Outcomes: Student will be able to...

1. Comprehend the environmental ramifications of computing devices and technologies, which involve assessing their life cycles and analyzing their carbon footprints.
2. Apply principles of sustainable software development to create energy-efficient and resource-optimized software solutions.
3. Analyze and evaluate environmental policies and regulations relevant to the tech industry, considering ethical considerations and corporate social responsibility.
4. Develop practical skills in measuring, analyzing, and reducing the environmental footprint of digital products and systems.
5. Collaborate effectively in addressing real-world environmental challenges within the context of computer science, proposing innovative solutions and promoting environmental awareness in the tech sector.

SEMESTER- IV

BCST241: Object Oriented Concepts Using JAVA

Course Objectives: Student will be able to

1. To improve the analytical skills of object oriented programming and formal introduction to java programming language
2. To understand object oriented programming language
3. To study abnormal termination of a program using exception handling
4. To imbibe User Interface using Swing and AWT

Course outcomes: Student should be able to

1. Demonstrate professionally acceptable coding and performance standard.
2. Understand the basic principles of the object-oriented programming
3. Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.
4. Identify the principles of the applets and its GUI programming

BCST 242: Computational Statistics

Course Objectives: Students will be able to

- 1) To understand the technique of data collection & its presentation.
- 2) To learn various measures of central tendencies, dispersion, moments, skewness, kurtosis and to interpret them.



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- 3) To describe concept of correlation coefficient and how to interpret its value. Evaluate correlation coefficients.
- 4) To apply concept of simple linear regression.
- 5) To study basic concept of probability, axiomatic theory of probability, univariate probability distribution. Evaluate difference between random and non-random experiments. Evaluate probabilities of different events. Apply the concept of conditional distribution.

Course Outcomes:

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

- 1) Learn Mathematical averages, positional averages, measure of dispersion, moments skewness and kurtosis, Types of correlation, fitting of line of Regression, sample space, power set definition of probability
- 2) Create Constructions of Diagrams and Graphs, Mathematical Averages and Positional Averages, Absolute and Relative measures of dispersion, Moments Skewness and Kurtosis, Bivariate data, Correlation, Regression, Random experiment, events and types of events, Conditional Probability and Independence of events.
- 3) Evaluate Relation between AM, GM, HM, Derivation of Median and Mode, Properties of Measures of central tendency and dispersion, First four raw and central moments, measures of Skewness and Kurtosis, Interpretation of r if $r=1$, $r=-1$, $r=0$, Properties of correlation coefficient, Derivation of the formula for Spearman's rank correlation coefficient
- 4) Apply fitting of regression plan by method of least square Examples on sample space, simple examples on probability based on permutation and combination, Theorems on probability.

BCSP 243: Lab Course (Object Oriented Concepts Using JAVA)

Course Objectives: Students should be able to...

1. To improve the analytical skills of object-oriented programming and formal introduction to Java programming language.
 2. To understand Object Oriented Programming language.
 3. To study abnormal termination of a program using exception handling.
 4. To imbibe User Interface using Swing and AWT
- Course outcomes-Students should be able to**
1. Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard
 2. Learn the basic principles of the object-oriented programming.
 3. Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.
 4. Analyse professionally acceptable coding and performance standard.
 5. Demonstrate graphical user interfaces, multithreaded programming, and event-driven programming.

BCSP 244: Lab course I (Computational Statistics I)

OBJECTIVES: Student should able to

1. To understand statistical data.
2. To evaluate various measures of central tendency, dispersion, moments, skewness and kurtosis.
3. To learn linear relationship between the two variables.
4. To predict value for dependent variable with the help of independent variable

Learning Outcomes: Students are able to

- 1) Create diagram and graphs based on frequency distribution.
- 2) Learn how to summarize data and find averages as well as spread of the data from central value (average).
- 3) Evaluate the coefficient of correlation between two and more variables.
- 4) Predict value of one variable when other is known by using technique of regression analysis.
- 5) Learn the probabilities of events and conditional probabilities.

BET 245 : Fundamentals of 8051 Microcontroller

Course Objectives: Student will able to...

1. Understand the fundamental components and organization of microcomputers
2. Study the architectural features of the 8051 microcontroller.
3. Study the instruction set of the 8051 microcontroller.
4. Develop Practical Programming Skills:

Course Outcomes: The students should be able to...

1. Apply Microcomputer Concepts
2. Analyze 8051 Architecture and Features
3. Execute assembly language programs utilizing the 8051 instruction set
4. Design and Implement Embedded Systems Solutions.

**Lab II: BEP 246 : 8051 Microcontroller Lab
(Hardware and Circuit Simulation Software)**

Course Objectives: Students will able to...



1. Familiarize with Microcontroller Development Tools
2. Develop skills in writing efficient assembly code
3. Develop Algorithmic Skills
4. Provide practical experience in interfacing the 8051 microcontroller with external peripherals.

Course Outcomes: The students should be able to...

1. Utilize Microcontroller Tools Effectively
2. Implement Assembly Language Programming
3. Design and Execute Complex Algorithms
4. Interface Microcontroller with External Devices

SEMESTER – V

BCST501: Software Engineering

Course Objectives: Student will able

1. To learn and understand the Concepts of Software Engineering .
2. To Learn and understand Software Development Life Cycle.
3. To apply the project management and analysis principles to software project development.
4. To apply the design & testing principles to software project development.

Course outcomes: Students should be able to

1. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
2. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software .
3. Translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
4. Explain the software engineering principles and techniques that are used in developing quality software products.

BCST502: Introduction to .NET using C#

Course Objectives: Student will able

1. To Students will gain the ability to implement the algorithms in C#.net, VB.net and ASP.net.
2. To provide the knowledge of Dot Net Frameworks along with C#.
3. To analyze object-oriented paradigm in the C # programming language.
4. To understand different windows based applications using standard controls and components.

Course outcomes: Student should be able to

1. Use the features of Dot Net Framework along with the features of C#.
2. Develop correct, well-documented programs using the C# programming language.
3. Learn to develop object-oriented programs using C# classes and objects.
4. Learn to use Windows Forms and WPF to create GUI-based programs.

BCST503: Advanced JAVA Programming

Course Objectives: Student will able

1. To obtain the basic knowledge of object oriented programming, concepts of basic JAVA ,advanced JAVA and Server side scripting(JSP).
2. To develop distributed business applications, develop web pages using advanced server- side programming through servlets and Java server pages.
3. To design and develop error-free, well-documented Java programs.
4. To learn how to write, test, and debug advanced-level Object-Oriented programs using Java.

Course outcomes: Student should be able

1. To design a graphical user interface (GUI) with Java Swing API.
2. To use event handling in Java applications and to draw various shapes using AWT Components.
3. To develop JSP applications using JSP Tags, JSP Scriptlets and JSP Application Models.
4. To evaluate solid Java applications using Java Database Connectivity (JDBC) to interact with relational databases and how to do fundamental database activities utilizing JDBC (Java Database Connectivity) API.

Elective:

Course XII : BCST504: Internet of Things(IOT)

Course Objectives: Student will able

1. To learn the basics of Introduction to IoT.



2. To understand the state of Art -IoT Architecture & Market perspective model.
3. To understand the Android OS architecture and Understand the application development lifecycle.
4. To study Android's APIs for data storage, retrieval, user preferences, files and content providers.

Course outcomes-Students should be able to

1. Learn IoT architecture.
2. Understand program Embedded IoT devices.
3. Use IoT protocol to upload sensor data and to control devices.
4. Design IoT application.

Elective:

BCST505: Programming Essentials in python

Course Objectives: Student will able

1. To understand programming skills in core Python.
2. To acquire Object Oriented Skills in Python
3. To develop the skill of designing Graphical user Interfaces in Python.
4. To inculcate Problem solving and programming capability.

Course outcomes-Students should be able to

1. Understand why Python is a useful scripting language for developers.
2. Learn how to design and program Python applications.
3. Explain basic principles of Python programming language
4. Implementing database and GUI applications.

Elective:

BCST506: Multimedia Computing

Course Objectives: Student will able

1. To understand how still images, sound, and video can be digitized on the computer.
2. To create their own multimedia programs using software tools.
3. To formulate a working definition of interactive multimedia.
4. To study competence in using the authoring multimedia program.

Course outcomes-Students should be able to

1. Understand the characteristics of different media, multimedia data,data formats.
2. Learn the characteristics of a human's visual system; understand the characteristics of a human's audio system.
3. Analyze different compression principles and understand different compression techniques.
4. Design and develop multimedia systems according to the requirements of multimedia applications.

SECCCST507: Programming with SCILAB

Course Objectives: Student will able

1. To analyze knowledge of physics and mathematics is transformed into a computer program.
2. To provide a powerful computing environment for engineering and scientific applications , this includes hundreds of mathematical functions.
3. To introduce basic concepts of scientific programming using Scilab.
4. To understand advanced data structures, 2-D and 3-D graphical functions.

Course outcomes-Students should be able to

1. Understand the main features of the SCILAB program development environment to enable their usage in higher learning.
2. Implement simple mathematical functions/equations in a numerical computing environment such as SCILAB.
3. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
4. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using SCILAB tools.

BCSP508: Lab Course V - Software Engineering and Introduction to .NET using C# Lab

Course Objectives: Student will able to

1. To broaden their knowledge of software engineering.
2. To learn software testing algorithms and programs.
3. To provide the knowledge of dot net frameworks along with c#
4. To analyze object-oriented paradigm in the c # programming language.

Course outcomes-Students should be able

1. Learn how to design and program Python applications.
2. Implement database and GUI applications.



3. Use the features of Dot Net Framework along with the features of C#.
4. Develop correct, well-documented programs using the C# programming language .

BCSP509: Lab Course VI- Advanced Java Programming and Internet of Things (IOT) / Programming Essentials in Python/ Multimedia Computing Lab

Course objectives: Student will able

1. To learn how to design a graphical user interface (GUI) with Java Swing and AWT.
2. To Develop applications using JSP and Servlet.
3. To Understand IoT architecture.
4. To create their own multimedia programs using software tools.

Course outcomes-Students should be able

1. To design and develop web applications to establish a JDBC connection between database and applications.
2. To learn to access database through Java programs, using Java Database Connectivity.
3. To learn, create dynamic web pages, using Servlets and JSP.
4. Build and deploy his/ her IOT application/Python applications or Multimedia applications.

SECCCSP510: Lab Course - Programming with SCILAB

Course Objectives: Student will be able

1. To analyze knowledge of physics and mathematics is transformed into a computer program.
2. To provide a powerful computing environment for engineering and scientific applications , this includes hundreds of mathematical functions.
3. To introduce basic concepts of scientific programming using Scilab.
4. To access advanced data structures, 2-D and 3-D graphical functions.

Course outcomes-Students should be able to

1. Understand the main features of the SCILAB program development environment to enable their usage in the higher learning.
2. Implement simple mathematical functions/equations in numerical computing environment such as SCILAB.
3. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
4. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using SCILAB tools.

SEMESTER- VI

BCST601: E – Commerce

Course Objectives: Student will able

1. To understand the complexity of e-commerce and its many facts.
2. To explore how e-business and e-commerce fit together.
3. To recognize the benefits and limitations of e-commerce.
4. To identify the main barriers to the growth and development of e-commerce in organisations.

Course outcomes: Student should be able to

1. Gain a comprehensive understanding of the E-Commerce landscape, current and emerging business models, and the technology and infrastructure underpinnings of the business.
2. Develop an understanding on how the internet can help business grow .
3. Able to understand the importance of security, privacy, and ethical issues as they relate to E-Commerce.
4. Recognize the impact of Information and Communication technologies, especially of the Internet in business operations

BCST602: Advanced C# Programming

Course Objectives: Student will able

1. To Streamline data-centric applications with C# extended features and the Entity Framework
2. To Integrate Microsoft Core with .NET Framework applications for high-performance data access.
3. To analyze the various stages in the processing of web forms and different types of controls.
4. To implement and deploy the website.

Course outcomes: Student should be able to

1. Understand the useful and advanced concepts in C# like multithreading, error handling, reflection etc.
2. Understand the new features that are unique to C# such as properties, indexers, delegates, events and namespaces.



3. Learn the features of ASP.NET version 2.0 and the various stages in the processing of web forms and types of controls such as server controls, web controls, HTML controls, validation controls, user control and data binding controls
4. Understand how ADO.NET is used in web development using ASP.NET and the concept of files and how database connection is established.

BCST603: Computer Graphics

Course Objectives: Student will able

1. To understand the basics of various input and output computer graphics.
2. To make the student present the content graphically.
3. To Gain knowledge about graphics hardware and software.
4. To understand Various 2D and 3D objects transformation techniques

Course outcomes-Students should be able

1. To understand the various computer graphics, graphics devices.
2. To understand the graphics programs and implementation, graphics functions and how to apply it.
3. To understand 2D and 3D viewing technologies, Various 2D and 3D objects transformation techniques.
4. To understand clipping techniques and drawing various shapes using it. To be able to learn OpenGL, its operations and programming using OpenGL.
- 5.

BCST604: Fundamentals of Artificial Intelligence

Course Objectives: Student will able

1. To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.
2. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems.
3. To review the different stages of development of the AI field from human-like behavior to Rational Agents.
4. To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.

Course outcomes: Student should be able to

1. Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
2. Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
3. Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.
4. Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.

BCST605: Web Technology

Course Objectives: Student will be able to

1. Understand client server architecture.
2. Study of web applications using java technologies
3. Gain the skills and project-based experience needed for entry into web application and development careers.
4. Learn different web related technologies.

Course outcomes: Student should be able to

1. Understand the fundamentals of web protocols.
2. Learn different web related technologies currently used.
3. Understand Studying data handling in web systems.
4. Analysing a wide range of web security vulnerabilities and issues.

BCST606: Software Project Management

Course Objectives: Student will be able to

1. Understand the fundamental principles of Software Project management.
2. Grasp good knowledge of responsibilities of project manager and how to handle these.
3. Understand the different methods and techniques used for project management.
4. Learn Software Metrics and Quality Standards.

Course outcomes: Student should be able to

1. Understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
2. Familiar with the different methods and techniques used for project management.
3. Evaluating good knowledge of the issues and challenges faced while doing Software project Management.
4. do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques



3. Learn the features of ASP.NET version 2.0 and the various stages in the processing of web forms and types of controls such as server controls, web controls, HTML controls, validation controls, user control and data binding controls
4. Understand how ADO.NET is used in web development using ASP.NET and the concept of files and how database connection is established.

BCST603: Computer Graphics

Course Objectives: Student will able

1. To understand the basics of various input and output computer graphics.
2. To make the student present the content graphically.
3. To Gain knowledge about graphics hardware and software.
4. To understand Various 2D and 3D objects transformation techniques

Course outcomes-Students should be able

1. To understand the various computer graphics, graphics devices.
2. To understand the graphics programs and implementation, graphics functions and how to apply it.
3. To understand 2D and 3D viewing technologies, Various 2D and 3D objects transformation techniques.
4. To understand clipping techniques and drawing various shapes using it. To be able to learn OpenGL, its operations and programming using OpenGL.
- 5.

BCST604: Fundamentals of Artificial Intelligence

Course Objectives: Student will able

1. To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.
2. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems.
3. To review the different stages of development of the AI field from human-like behavior to Rational Agents.
4. To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.

Course outcomes: Student should be able to

1. Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
2. Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
3. Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.
4. Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.

BCST605: Web Technology

Course Objectives: Student will be able to

1. Understand client server architecture.
2. Study of web applications using java technologies
3. Gain the skills and project-based experience needed for entry into web application and development careers.
4. Learn different web related technologies.

Course outcomes: Student should be able to

1. Understand the fundamentals of web protocols.
2. Learn different web related technologies currently used.
3. Understand Studying data handling in web systems.
4. Analysing a wide range of web security vulnerabilities and issues.

BCST606: Software Project Management

Course Objectives: Student will be able to

1. Understand the fundamental principles of Software Project management.
2. Grasp good knowledge of responsibilities of project manager and how to handle these.
3. Understand the different methods and techniques used for project management.
4. Learn Software Metrics and Quality Standards.

Course outcomes: Student should be able to

1. Understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
2. Familiar with the different methods and techniques used for project management.
3. Evaluating good knowledge of the issues and challenges faced while doing Software project Management.
4. do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques



SECCCST607: Entrepreneurship Development

Course Objectives: Student will be able

1. To study the product design and development process
2. To Identification of opportunities for development
3. To learn the mechanism of finance and fundraising.
4. To understand the importance of marketing for better business opportunities.

Course outcomes: Student should be able to

1. Identify feasibility of product design and development
2. Get the idea about IP rights
3. Avail the financial and marketing skill
4. Prepare the proposal for a small scale industry.

BCSP608: Lab Course VII : (E-Commerce and Advanced C# Programming Lab)

Course objectives: Student will able

1. To design web pages using html.
2. To Develop familiarity with the JavaScript language.
3. To develop, implement and creating Applications with C#.
4. To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web

Course outcomes-Students should be able

1. To learn how to build real world creative and modern websites .
2. To Create ASP.Net applications using standard .net controls.
3. To understand and be able to explain Security in the .NET framework and Deployment in the .NET.
4. To develop Assemblies and Deployment in .NET, Mobile Application Development.

BCSP609: Lab Course VIII : Computer Graphics and Fundamentals of Artificial Intelligence/ Web Technology /Software Project management Lab

Course objectives: Student will able

1. To learn how to use graphics commands and Functions in graphics and implementation 2D and 3D transformation
2. To Interpret PROLOG programs and to solve a variety of problems.
3. To develop a web application using java technologies.
4. To understand the fundamental principles of Software Project management

Course outcomes-Students should be able

1. To understand basic graphics commands and learn various functions and basic operations.
2. To familiarize yourself with the basic principles of the programming language Prolog.
3. To learn different web related technologies currently used.
4. To learn Software Metrics and Quality Standards.