

**Rayat Shikshan Sanstha's
Yashavantrao Chavan Institute of Science, Satara
Department of Computer Science
Syllabus For Bachelor of Computer Science-Part I**

**Syllabus
to be implemented w. e. f. June, 2024 NEP 2020**

**Semester -I
Theory: BCST111: Course I: 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:Course II: 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. Learn the fundamentals of electronic circuits.
2. Study and verify different and theorems
3. Summarize Two Port Networks.
4. Understand dc and ac circuits

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. Learn and verify various number systems.
2. Study logic gates and Boolean algebra.
3. Classify different logic families.
4. 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: BCSP 116

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. develop a foundational understanding of key mathematical concepts including logic, divisibility in integers, counting principles, and relations.
2. apply logical reasoning, solve problems related to integer divisibility, utilize counting techniques.
3. analyze and solve combinatorial problems.
4. 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. introduce the technique of data collection & its presentation.
2. compute various measures of central tendencies, dispersion, moments, skewness, kurtosis and to interpret them.
3. introduce concept of correction coefficient and how to interpret its value.
4. 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
Lab Course II: BCSP 119 (Based on BCST 117 and BCST 118)

Course Objectives: students will be able to:

1. 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. 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. represent statistical data and evaluate various measures of central tendency.
4. 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.

Syllabus DSC – I
B.Sc. I - Semester-II
Theory: Course I: BCST121: C Programming-II

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

1. define a programming logic.
2. learn advanced concepts of c language.
3. understand skills for writing complex programs using 'C'.
4. 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
Course IV: 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
BCSP113: 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: Course II: BCST124: Semiconductor Devices

Course Objectives: Students should be able to

1. Learn the basics of a semiconductor materials
2. Interpret rectifiers and regulators.
3. Understand the basics of transistors and various configurations.
4. 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.

Semester II

Course II: BCST 122: Digital Electronics-II

Course Objectives: Students should be able to ...

1. Learn sequential logic circuits.
2. Study counter circuits.
3. Understand the concept of Shift register and Programmable Logic Device.
4. 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.

Semester II
BCSP 123: (Based on BET121 & BET122)

Course Objectives: Students should be able to...

1. Learn half wave and full wave rectifier circuits.
2. Study fixed and variable IC regulators.
3. Understand Flip-flop circuits.
4. 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.

B. Sc. I – Semester – II
Theory: BCST 127: Graph Theory

Course Objectives: Students will be able to

1. Provide a comprehensive understanding of graph theory.
2. Study of graphs, operations on graphs, connected graphs, and trees.
3. Analyze and manipulate various types of graphs, understand the properties and applications of connected graphs.
4. 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. Explore graphs and isomorphisms, perform operations on graphs such as union, intersection, complement, and self-complement and utilize matrix representations of graphs.
2. 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. Compute probabilities of different events, conditional distribution.
4. 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.

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**Semester – III
Course – V:
BCST124: Data Communications and Computer
Networks**

Course Objectives: Student will be able to

1. Understand different types of networks, various topologies and application of networks.
2. Remember types of addresses, data communication.
3. Study the concept of networking models, protocols, functionality of each layer.
4. Imbibe basic networking hardware configuration and tools.

Course outcomes: Student should be able to

1. Understand the fundamentals computer network organization- Networking techniques.
2. Apply the knowledge, concepts and terms related to Data Communication through a Network.
3. Analyze the basic concept of OSI layer.
4. Identify Active Directory logical components and infrastructure, create and manage file System access security.

Course VI: BCST302: Algorithms and Data Structures using C

Course Objectives: Student will be able to

1. Understand the basic concepts such as Linear and Non Linear Data structures.
2. Apply the notations used to analyze the Performance of algorithms.
3. Imbibe the behavior of data structures such as stacks queues and their representations.
4. 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.

BCSP303: Lab Course I (Data Communications and Computer Networks And Algorithms and Data Structures using C)

Course Objectives: Student will be able to

1. Understand the concept of networking models, protocols, functionality of each layer.
2. Learn basic networking hardware and tools.
3. Study the notations used to analyze the Performance of algorithms.
4. Identify the behavior of data structures such as stacks queues and their representations.

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. Understand 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.

SEMESTER- IV
Course VII: BCST401: Operating Systems

Course Objectives: Student will be able to

1. Understand the basic organization of operating system.
2. Imbibe brief about OS organization.
3. Study memory management techniques.
4. Learn Shell operating system.

Course outcomes: Student should able to

1. Understand the fundamentals of operating systems and its types.
2. Imbibe the basic Operating System Organization.
3. Identify the process & memory management in Operating System.
4. Design programs using a Shell Scripting.

Course VIII: BCST402: Object Oriented Concepts using JAVA

Course Objectives: Student will be able to

1. Improve the analytical skills of object oriented programming and formal introduction to Java programming language
2. Understand Object Oriented Programming language
3. Study abnormal termination of a program using exception handling
4. 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

BCSP403: Lab Course II (Operating Systems and Object Oriented Concepts using JAVA)

Course objectives: Student will be able to

1. Understand Shell operating system and memory management techniques.
2. Identify the need to create the special purpose operating system
3. Learn case studies to demonstrate practical applications of different concepts.
4. Imbibe scope to students where they can solve small, real life problems.

Course outcomes-Students should be able to

1. Derive the process & memory management in Operating System and the basic Operating System organization.
2. Design programs using a Shell Scripting.
3. Analyze professionally acceptable coding and performance standard.
4. Demonstrate graphical user interfaces, multithreaded programming, and event-driven programming.

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Semester – V

Course – IX :

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.

Course X : 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.

Course XI : 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:

Course XII : 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:
Course XII : 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.

Course XII :
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. Broaden their knowledge of software engineering.
2. learn Software testing algorithms and programs.
3. provide the knowledge of Dot Net Frameworks along with C#
4. analyze object-oriented paradigm in the C # programming language.

Course outcomes-Students should be able

1. To learn how to design and program Python applications.
2. To Implement database and GUI applications.
3. To use the features of Dot Net Framework along with the features of C#.
4. To 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 lab

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
Course – XIII :
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

Course – XIV :
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 different 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.

Course XV :
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.

Course – XVI :
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.

Course – XVI :
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.

Course – XVI :
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

Course – XVI :
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.

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**Semester I
Paper I**

MCST101: Design& Analysis of Algorithms

Learning Objectives:

1. To learn the algorithms and to learn basic Algorithm Analysis techniques and understand the use of asymptotic notation.
2. To understand different design strategies and Greedy Method.
3. Understand classical problem and solutions and Learn a variety of useful algorithms
4. Understand classification of problems

Learning Outcomes: Students are able to

1. Understanding Algorithmic complexity and analyzing the same
2. Developing an understanding of various techniques and methods to design algorithms
3. Skill to make the algorithm and solve real-world problems
4. Analysis of traditional algorithms and apply to various problems.

Semester I
Paper II
MCST 102: Principles of Programming Language

Learning Objectives:

To prepare student to think about programming languages analytically:

1. Compare programming language designs
2. Learn new languages more quickly
3. Understand basic language implementation techniques
4. Learn small programs in different programming Languages

Learning Outcomes:

After completion of this course student will be able to

1. Get knowledge of, and ability to use, language features used in current programming languages.
2. To program in different language paradigms and evaluate their relative benefits.
3. Understand key concepts in the implementation of common features of programming languages.
4. To implement object oriented Programming concepts.

Semester I
Paper III
MCST103:Advanced Database Management System

Learning Objectives:

1. Learn different types of databases.
2. Be exposed to query languages and active databases.
3. Be familiar with the indexing techniques.
4. Learn how to solve complex and recursive queries.

Learning Outcomes:

1. Demonstrate the basics of query evaluation and heuristic query optimization techniques.
2. Apply Concurrency control and recovery mechanisms for the desirable database problem.
3. Apply security to database.
4. Design and implement the database system with the fundamental concepts of DBMS.

Semester I
Paper IV
MCST104:Advanced Computer Networks

Learning Objectives:

1. To understand the concept of security and its applications
2. To know various detection and prevention techniques in diversified environments
3. To learn various vulnerabilities, threats and attacks
4. To prepare globally competent post graduates with enhanced domain knowledge and skills attaining professional excellence

Learning Outcomes:

1. Design and choose appropriate security model
2. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
3. Able to use specific frameworks as per applications need.
4. Have a working knowledge of datagram and internet.

Semester I
LAB-I
MCSP105: Design& Analysis of Algorithms and Principles of Programming

Learning Objectives:

1. To understand how to implement different algorithms.
2. To learn how to use different methods to solve real world Problems.
3. To learn how to program using scala language.
4. To understand implementation of Object Oriented concepts.

Learning Outcomes: Students will be able to

1. To understand and implement different algorithms.
2. To learn and use different methods to solve real world Problems.
3. To program using scala language.
4. To implement Object Oriented concepts.

Semester I
LAB–II
MCSP106: Advanced DBMS & Digital Image Processing

Learning Objectives:

1. Understand the basic concepts and the applications of database systems.
2. Master the basics of SQL and construct queries using SQL.
3. To study the basics of Computer Networks
4. To study TCP /IP Protocols and implement it.

Learning Outcomes:

1. Understand the basic concepts and the applications of database systems.
2. Master the basics of SQL and construct queries using SQL.
3. Apply cryptographic algorithms of encryption and description
4. Learn TCP /IP Protocol suite.

SEMESTER II
Paper V
MCST 201 : Python Programming

Learning Objectives:

1. An understanding of programming language paradigm.
2. Understanding of Lambda Calculus.
3. Learning functional programming language Python.
4. To learn and implement Database concepts in python

Learning Outcomes:

On completion of the course, student will be able to–

1. To understand and use basics of Python
2. To Solve problems by using Python language.
3. To implement projects by using Python Framework.
4. To create application with help of python libraries.

Semester II
Paper VI
MCST 202 :Cloud Computing

Learning Objectives:

1. To understand the principles and paradigm of Cloud Computing
2. To appreciate the role of Virtualization Technologies
3. Ability to design and deploy Cloud Infrastructure
4. Understand cloud security issues and solutions

Learning Outcomes :

1. Understand the fundamental principles of distributed computing.
2. Understand how the distributed computing environments known as Grids can be built from lower level services.
3. Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
4. Analyze the performance of Cloud Computing.

Semester II
Paper VII
MCST 203: Cyber Security and Law

Learning Objectives:

- 1) Study the concepts of Cyber Security
- 2) Protect and defend computer systems and networks from cyber security attacks
- 3) Understand the cyber law and Rights in Cyberspace
- 4) Understand Cyber Torts and Dispute Resolution in Cyberspace

Learning Outcomes:

After completion of this course student will be able to

- 1) Realize the need for Cyber Security
- 2) Understand the need for Security in day to day communications
- 3) Understand the cyber law and rights in cyberspace
- 4) Understand Cyber Torts and Dispute Resolution in Cyberspace

Semester II
Paper IX
MCST 204: Digital Image Processing

Learning Objectives:

1. To learn the fundamental concepts of Digital Image Processing.
2. To study basic image processing operations.
3. To understand image analysis algorithms.
4. To expose students to current applications in the field of digital image processing

Learning Outcomes: After successfully completing the course students will be able

1. To understand fundamentals of Image Processing
2. To understand image segmentation and morphological operations.
3. To Develop and implement algorithms for digital image processing.
4. To Apply image processing algorithms for practical object recognition applications.

Semester II Paper X
MECST205: Mathematical and Statistical Foundation

Learning Objectives :

1. To Understand the notion of vector space..
2. To Work out algebra of linear transformations.
3. Appreciate connection between linear transformation and matrices.
4. Work out Eigen values, Eigen vectors and its connection with real life situation.

Learning Outcomes:

1. Explain the concepts of basis and dimension of a vector space.
2. Understands Eigen values, Eigen functions, Characteristic Polynomial of a matrix.
3. Design and analyze real world engineering problems by applying various statistical modeling techniques.
4. Formulate suitable statistical method required as pre-processing technique for finding the Solution of machine learning algorithm.
5. Model and solve computing problem using correlation, and resampling using appropriate statistics algorithms.

Semester II
LAB–III
MCSP : 206 Python Programming and Cloud Computing

Learning Objectives:

1. To learn how to read and write files in Python and use libraries of Python.
2. To learn how to design object-oriented programs with Python classes.
3. Analyze the problems and solutions to cloud application problems.
4. Apply principles of best practice in cloud application design and management

Learning Outcomes: 1. Understand the fundamental principles of distributed computing.

- 2. Understand how the distributed computing environments known as Grids can be built from lower level services
- 3. Explain basic principles of Python programming language
- 4. Implement object oriented concepts, Implement database and GUI applications

Semester II LAB–IV
MCSP 207: Cyber Security & Laws and Digital Image Processing

Learning Objective :

1. To study different types of Vulnerabilities of E-commerce services.
2. To learn encryption and decryption techniques.
3. Understand the basics of images, image transformations.
4. Understand Image Color Processing.

Learning Outcomes:

1. Student will be able to check security of Emails and E commerce Vulnerabilities.
2. Student will learn case studies of Cyber Security.
3. Student will be able to do image transformations.
4. Student will be able to do image Processing

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**Semester III
Paper X
MCST301: Emerging Technologies**

Course Objectives: Student will able to:-

- 1) Learn Creating Angular components
- 2) Understand concepts of Binding data and events
- 3) Create and validate Angular forms
- 4) Understand how to add routes to Angular applications

Course Outcome: Student should be able to:

Unit-I : Get familiar with client-side JavaScript frameworks and the Angular framework.

Unit-II : Use various Angular features including directives, components, and services.

Unit-III : Implement a functional front-end web application using Angular.

Unit-IV: Increase your rental capacity through innovative and independent learning

MCST 302 : Data Mining

Course Objectives: Student will able to:-

- 1) Understand the basics of Data Mining programming
- 2) Study facilities for performing data mining with Python packages
- 3) Learn python functionalities and features used for data mining
- 4) Explore Data analysis and Data Visualization using Python

Course Outcome: Student should be able to:

Unit-I: Implement data mining tasks using Python

Unit-II: Use the python packages to carry out data mining tasks.

Unit-III: Perform data analysis and data visualization using python packages.

Unit-IV: Perform Cluster Analysis using python packages.

Paper XII MCST303: Data Visualization using Tableau

Course Objectives: Student will able to:-

- 1) Understand and critically apply the concepts and methods of business analytics
- 2) Identify, model and solve decision problems in different settings
- 3) Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity
- 4) Create viable solutions to decision making problems

Course Outcome: Student should be able to:

Unit-I: Identify and describe complex business problems in terms of analytical models.

Unit-II: Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives.

Unit-III: Demonstrate ethical decision-making in structured or unstructured and ambiguous situations.

Unit-IV: Communicate technical information to both technical and non-technical audiences in speech, in writing, and graphically.

Paper XIII MCSET 304: Elective I (Artificial Intelligence)

Course Objectives:

- 1) Gain a historical perspective of AI and its foundations.
- 2) Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- 3) Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- 4) Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.

Course Outcome: Student should be able to:

Unit-I: Apply problem solving by intelligent search approach.

Unit-II: Represent knowledge using AI techniques.

Unit-III: Design Machine learning solution to real life problems and solutions to Uncertainty using Fuzzy Theory.

Unit-IV: Define a NLP problem and find a suitable solution to it and to develop a good understanding of all.

Paper XIV MCST305: Elective II: Machine Learning

Course Objectives: Student will able to: -

1. Understand the basic theory underlying machine learning.
2. Formulate machine learning problems corresponding to different applications.
3. Understand a range of machine learning algorithms along with their strengths and weaknesses.
4. Apply machine learning algorithms to solve problems of moderate complexity.

Course Outcome: Student should be able to:

Unit-I : Provide an introduction to the basic principles, techniques, and applications of Artificial Intelligence.

Unit-II: Ability to select and implement machine learning techniques and AI computing environment that are suitable for the applications under consideration.

Unit-III: Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.

Unit-IV: Use different machine learning techniques to design AI machine and enveloping applications for real world problems.

Paper: XIII MCSET 304: Elective I (Fundamentals of IOT)

Course Objectives: Student will be able to:-

- 1) Study fundamental concepts of IoT
- 2) Understand roles of sensors in IoT
- 3) Learn different protocols used for IoT design
- 4) Understand data handling and analytics tools in IoT

Course Outcome: Student should be able to:

Unit-I: Understand the various concepts, terminologies and architecture of IoT systems.

Unit-II: Use sensors and actuators for design of IoT.

Unit-III: Understand and apply various protocols for design of IoT systems

Unit-IV: Use various techniques of data storage and analytics in IoT

Paper : XIV
MCSET 305: Elective I (Microcontrollers for IOT)

Course Objective: Student will be able to:-

- 1) Give students hands-on experience using different IoT architectures. 2) Provide skills for interfacing sensors and actuators with different IoT architectures. 3) Develop skills on data collection and logging in the cloud. 4) Understand Arduino Uno boards and programming.

Course Outcome: Student should be able to:

- 1) To use Arduino Uno, NODE MCU 8266.
- 2) To use Raspberry PI along with critical protocols and its communication to cloud.
- 3) To apply commonly used IOT protocols such as REST API, MQTT through IOT based demonstration.
- 4) To solve analog sensor and digital sensor interfacing with IOT devices.

Semester III
**PRACTICAL COURSE: LAB–V MCSP306: Angular JS and Data Mining
and Data Visualization using Tableau**

Course Objectives: Student will be able to:-

- 1) Understand the basics of Python programming
- 2) Study facilities for performing data mining with Python packages
- 3) Identify, model and solve decision problems in different settings
- 4) Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity

Course Outcome: Student should be able to:

Unit-I: Use various Angular features including directives, components, and services.

Unit-II: Implement a functional front-end web application using Angular.

Unit-III: Boost your hire ability through innovative and independent learning.

Unit-IV: Communicate technical information to both technical and nontechnical audiences in speech, in writing, and graphically.

**PRACTICAL COURSE: LAB–VI MCSP307: Elective (Machine Learning
and Artificial Intelligence)**

Course Objectives: Student will be able to:-

1. Understand the basic theory underlying machine learning.
2. Formulate machine learning problems corresponding to different applications.
3. Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
4. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

Course Outcome: Student should be able to:

Unit-I: Provide an introduction to the basic principles, techniques, and applications of Artificial Intelligence.

Unit-II: Ability to select and implement machine learning techniques and AI computing environment that are suitable for the applications under consideration

Unit-III: Represent knowledge using AI knowledge representation techniques.

Unit-IV: Design Machine learning solution to real life problems and solutions to uncertainty using Fuzzy theory.

LAB–IV

MCSP307: Elective (Fundamentals of IOT and Microcontrollers for IOT)

Course Objectives: Student will be able to:-

- 1) To study fundamental concepts of IoT and familiar with data handling and analytics tools in IoT.
- 2) To give students hands-on experience using different IoT architectures.
- 3) To provide skills for interfacing sensors and actuators with different IoT architectures.
- 4) To develop skills on data collection and logging in the cloud and understand Arduino Uno boards and programming.

Course Outcome: Student should be able to:

Unit-I: Understand the various concepts, terminologies and architecture of IoT systems.

Unit-II: Use sensors and actuators for design of IoT.

Unit-III: Understand and apply various protocols for design of IoT systems

Unit-IV: Use various techniques of data storage and analytics in IoT

SEMESTER IV

Paper XV

MCST 401 : Elective II (Deep Learning)

Course Objectives: Student will be able to:-

- 1) Understand the context of neural networks and deep learning
- 2) Know how to use a neural network
- 3) Understand the data needs of deep learning
- 4) Have a working knowledge of neural networks and deep learning

Course Outcome: Student should be able to:

Unit-I: Introduce the fundamental techniques and principles of Neural Networks

Unit-II: To study the different models in ANN and their applications

Unit-III: To familiarize deep learning concepts with Convolution Neural Network case studies and Apply deep learning mechanisms to various learning problems.

Unit-IV: Know the open issues in deep learning, and have a grasp of the current research directions.

Paper XVI
MCST 402: Elective II (Big Data Analytics)

Course Objectives: Student will be able to:-

1. Understand the Big Data challenges & opportunities, its applications
2. Understanding of concepts of map and reduce and functional programming
3. Gain conceptual understanding of Hadoop Distributed File System.
4. Bridge the gap between academics and industry needs.

Course Outcomes: After successful completion students will be able to:

Unit-I: Recognize the characteristics, applications of big data that make it useful to real-world problems.

Unit-II : Process available data using big data tools hadoop file system and predict outcomes to solve given problem.

Unit-III : Study & Design various case studies using big data tools/commands and analyse it.

Unit-IV: Evaluate business cases.

Paper XV
MCST 401: Elective II (Control Systems)

Course Objectives: Student will be able to:-

1. Apply systems theory to complex real world problems in order to obtain models that are expressed using differential equations, transfer functions, and state space equations.
2. Predict system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain.
3. Analyze the behavior of closed loop systems using various methods.
4. Design controllers using classical PID methods, root locus methods, and frequency domain methods.

Course Outcomes: After successful completion students will be able to:

Unit-I: Carry out modeling of discrete systems in state space

Unit-II: Evaluate programming strategies in the domain of control systems

Unit-III: Analyze systems in Time and frequency domain.

Unit-IV: Design modern control systems with computer simulation

Paper XVI
MCST 402 : Elective II (Wireless Sensor Networks)

Course Objectives: Student will be able to:-

- 1) Compare different wireless techniques such as mobile, radio, satellite etc
- 2) Understand modern wireless Sensor Networks
- 3) Distinguish wireless systems on the basis of performance features
- 4) Identify architecture, structure and security as well as privacy aspects in IoT
- 5) Design and configure RFID and WSN networks considering security issues

Course Outcomes: After completing this course the students should:

Unit-I: Understand and explain common wireless sensor node architectures.

Unit-II : Be able to carry out simple analysis and planning of WSNs.

Unit-III: Demonstrate knowledge of MAC protocols developed for WSN.

Unit-IV : Demonstrate knowledge of routing protocols developed for WSN.

Paper VII
PRACTICAL COURSE : Elective-II: LAB VII :
MCSEP 403 : Deep Learning and Big Data Analytics

Course Objectives: Student will be able to:-

- 1) Understand the context of neural networks and deep learning
- 2) Have a working knowledge of neural networks and deep learning
- 3) To understand the Big Data challenges & opportunities, its applications
- 4) Gain conceptual understanding of Hadoop Distributed File System.

Course Outcomes: After completing this course the students should:

- 1) To introduce the fundamental techniques and principles of Neural Networks
- 2) To study the different models in ANN and their applications
- 3) To familiarize deep learning concepts with Convolution Neural Network case studies
- 4) Apply deep learning mechanisms to various learning problems.
- 5) Know the open issues in deep learning, and have a grasp of the current research directions
- 6) Recognize the characteristics, applications of big data that make it useful to real-world problems.
- 7) Process available data using big data tools hadoop file system and predict outcomes to solve given problem.
- 8) Study & Design various case studies using big data tools/commands and analyze it

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

Unit-I : Carry out modeling of discrete systems in state space
Evaluate programming strategies in the domain of control systems
Unit-II: Analyze systems in Time and frequency domain.
Design modern control systems with computer simulation

Paper X

PRACTICAL COURSE: Elective-II: LAB VII

MCSEP 403: MCSEP 403 : Control Systems and Wireless Sensor Networks

Course Objectives: Student will be able to:-

- 1) Apply systems theory to complex real world problems in order to obtain models that are expressed using differential equations, transfer functions, and state space equations.
- 2) Predict system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain.
- 3) Design controllers using classical PID methods, root locus methods, and frequency domain methods.
- 4) Compare different wireless techniques such as mobile, radio, satellite etc
- 5) Design and configure RFID and WSN networks considering security issues

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

Unit-I : Carry out modeling of discrete systems in state space
Evaluate programming strategies in the domain of control systems
Unit-II: Analyze systems in Time and frequency domain.
Design modern control systems with computer simulation