Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science,

Satara (Autonomous)

Undergraduate Programme

B. Sc. Computer Science (Entire)

Syllabi of the course

(To be implemented from academic year 2023-2024)

Department of Computer Science (Entire)

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Preamble:

There are bright career prospects for computer science professionals or software professionals in recent scenario. With the opening of huge software and IT companies in India, the job opportunities for trained professionals have increased considerably. India is known to be a leader in software and IT sector.

Computer science graduates pass outs find job opportunities in a variety of environments in academia, research, industry, government, private, business organizations and so on. They are involved in analyzing problems for solutions, formulating and testing, using advanced communications or multi-media equipment, or working in teams for product development.

The software and IT companies are the major employers of computer science graduates. They offer the best packages to the young graduates which are unmatched with other branches of science.

General Objectives of the Programme:

1. To nurture academicians with focus and commitment to their subject.
2. To shape good and informed citizens from the students entering into the Programme.
3. To create a skilled workforce to match the requirements of the society.
4. To impart knowledge of Science is the basic objective of this Programme.
5. To develop scientific attitude is the major objective so as to make the students open minded, critical and curious.
6. To develop skill in practical work, experiments and laboratory materials and equipment's along with the collection and interpretation of scientific data to contribute toscience.

Programme Outcomes:

1. The students will graduate with proficiency in the subject of their choice.
2. The students will be eligible to continue higher studies in their subject.
3. The students will be eligible to pursue higher studies abroad.
4. The students will be eligible to appear for the examinations for jobs in government organizations.
5. The students will be eligible to apply for jobs with a minimum requirement of B.Sc. Programme.

Program Specific Objectives of the Course:

1. The content of the syllabus have been framed as per UGC norms of CBCSPattern.
2. The students are expected to understand the fundamentals, principles, mathematical, recent IT concepts and recent developments in the subjectarea.
3. The practical course is in relevance to the theory courses to improve the understanding of the concepts.
4. It is expected to inspire and boost interest of the students towards Computer Science as the mainsubject.
5. To develop the power of appreciations, the achievements in Computer and role in nature and society.
6. To enhance student sense of enthusiasm towards IT and to involve themin an intellectually stimulating experience of learning in a supportiveenvironment.

Program Specific Outcomes:

After successful completion of B.Sc. Computer Science (Entire) Course student will be able to:

1. Understand the basics of Computer Science.
2. Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learned in the classrooms.
3. Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental ComputerScience.
4. Identify their area of interest in academic, research anddevelopment.
5. Perform job in various fields' like IT, science, engineering, education, banking, business and public service, etc. or be an entrepreneur with precision, analytical mind, innovative thinking, clarity of thought , expression, and systematicapproach.

Revised B. Sc. Part-III Computer Science (Entire) Syllabus w. e. f. June 2020

B.Sc. Computer Science Entire Part-III

Year of Implementation: Revised Syllabus will be implemented from June2020
Duration: Part- III shall be of one academic year consisting of two semesters.
Pattern: Semester Pattern.

B.Sc. Part – III Computer Science Entire (2020-21)

Code	Course	Course Title
SEMESTER – V		
BCSET-501	Computer Science Paper – IX	Core Java
BCSET-502	Computer Science Paper – X	C# Programming - I
BCSET-503	Computer Science Paper – XI	PHP Part I
Elective Course I : BCSET-504 OR BCSET-505 OR BCSET-506		
BCSET-504	Computer Science Paper – XII	Fundamentals of Data Science
BCSET-505	Computer Science Paper – XII	Software Project Management
BCSET-506	Computer Science Paper – XIII	Machine Learning Part-I
BCSET- 507 SEC-I	Skill Enhancement Course – I	Numerical Skill in Computer Science Entire: Software Testing
AECC-E	English Paper – III	English for communication- III
BCSEP- 508 LAB	Lab Course Based on BCSET-501and BCSET 502	Lab
BCSEP- 509 LAB	Lab Course based on BCSET-503 and BCSET 504	Lab
BCSEP- 510 PW	Project Work	Project Work
SEMESTER – VI		
BCSET-601	Computer Science Paper – XIII	Advanced Java
BCSET-602	Computer Science Paper – XIV	C# Programming - II
BCSET-603	Computer Science Paper – XV	PHP Part II
Elective Course II: BCSET-604 OR BCSET-605 OR BCSET-606		
BCSET-604	Computer Science Paper – XVI	Internet of Things (IoT) for Data Science
BCSET-605	Computer Science Paper – XVI	Android Programming
BCSET-606	Computer Science Paper – XVII	Machine Learning Part-II
BCSET- 607 SEC-II	Skill Enhancement Course – II	Entrepreneurship in IT
AECC-F	English Paper – IV	English for communication- IV
LAB	Lab Course Based on BCSET-601	
LAB	Lab Course based on BCSET- 602	
LAB	Lab Course based on SEC- I & SEC-II	
PW	Project Work	

FIFTHSEMISTER ----------(NOOFTHEORY&PRACTICALPAPERS

Subject	Paper	ESE	Internal Exam		Subject	Submission		
			ISE- I	ISE-II		Exam	Case study/ Educational Tour/ Seminar	Day to day Performance
BCSET-501	Core Java	40	5	5	BCSEP-506:	40	5	5
BCSET-502	C# Programming - I	40	5	5				
BCSET-503	PHP Part I	40	5	5	BCSEP- 507:	40	5	5
BCSET-504	A) Fundamental of Data Science B) Software Project Management C) Machine Learning Part-I	40	5	5				
BCSET-505 SEC-I	Numerical Skill in Computer Science Entire: Software Testing	20	0	0	BCSEP- 508:	30	10	10
AECC	English	40	5	5	SECP- 509:	30	0	0
Total of SEM IV	TOTAL	220	25	25	0	140	20	20
	GRAND TOTAL	**450**						

Subject	Paper	ESE	Internal Exam		Subject	Submission		
			ISE- I	ISE-II		Exam	Case study/ Educational Tour/ Seminar	Day to day Performance
BCSET-601	Core Java	40	5	5	BCSEP-606:	40	5	5
BCSET-602	C# Programming - I	40	5	5				
BCSET-603	PHP Part I	40	5	5	BCSEP- 607:	40	5	5
BCSET-604	a. Fundamental of Data Science b. Software Project Management c. Machine Learning Part-I	40	5	5				
SEC-I	Numerical Skill in Computer Science Entire: Software Testing	20	0	0	BCSEP- 608:	30	10	10
AECC	English	40	5	5	SECP-609:	30	0	0
Total of SEM IV	TOTAL	220	25	25	0	140	20	20
	GRAND TOTAL	**450**						

B.Sc. Part III: Computer Science (Entire)

BCSET-501: Core Java

Course Objectives: - Student will be able to …

1. To learn basic concepts of Java Language
2. To study the concepts of classes and objects.
3. To study the concepts of Inheritance, packages, and interfaces.
4. To understand Exception handling and multithreading

Credits= 2	**SEMESTER-V BCSET-501: Core Java**	**No. of hours per unit/ credits**
UNIT I	**Java Language Basics**	**(9)**
	History and features of Java, Java Virtual Machine (JVM), JDK tool (Folder structure-for practical purpose only), Structure of java program, compilation and execution of java program, Java keywords, Data types. Java variables- declaration and assigning values to variables (using assignment statement and Scanner class object), scope of variables, Type casting- Implicit and Explicit casting, Operators of java, Control structures of java –1-Branching statements- If, if …. else, if …else if and switch statement, 2- Iterative statements- for loop, do… while, while loop, for each loop, 3- jumping statements-break and continue statement.	
UNIT II	**Introducing classes and objects**	**(9)**
	Introduction: Classes, Objects and methods, Defining a class, field declaration, method declaration, Accessing class members, access specifies in java, Static variables and methods, Method overloading, Constructor- types of constructors, constructor overloading, Use of this keyword, Garbage collection finalize(), wrapper classes, Array, types of array, array of object Collection-Iterator interface, List interface, Array List class, Linked List class, Vector class and Stack class.	
UNIT III	**Inheritance, packages and interfaces**	**(9)**
	Inheritance- definition, syntax, types of inheritance, Method overriding, use of super keyword, difference between method overloading and overriding, Dynamic method dispatch, Abstract class and method, use of final keyword, Interface- defining and implementing interface, implementation of multiple inheritance using Interface, difference between abstract class and interface. Packages- Java API package, Defining and accessing user defined package	

UNIT IV	Exception Handling and Multithreading	(9)
	Concept of exception, difference between error and exception, Types of exceptions-checked and unchecked, Exception handling using try and catch block, Multiple catch block, finally block, throws keyword, User defined exception, Concept of multithreading in java, Difference between process and thread, Creating thread by extending Thread class and by implementing Runnable interface, Life cycle of thread, Thread class methods- start (), run(), yield(), suspend() ,resume(), sleep(), wait(), notify(),stop(), Thread synchronization	

Course Outcomes: - student will be able to

1. Implement Object oriented concepts using java
2. Develop Object oriented software application
3. Develop multithreading applications
4. Handle exceptions while executing programs

Reference Books: –

1. Herbert Scheldt, Java2: The Complete Reference, Tata McGraw-Hill
2. Object Oriented Programming with JAVA Essentials and Applications, McGraw-Hill
3. Core and Advanced Java, Black Book - dreamtech
4. Programming with JAVA-EBalagurusamy

Lab Course: BCSEP 508: Lab course based on BCSET 501and BCSET 502

Practical Program List

BCSET 501- Core Java

Course Objectives:

1. To study Basic Java Programs
2. To study Class, object and methods in Java
3. To study use of Array, collection of Java
4. To use the Inheritance, packages and interfaces.
5. To use of the Exception handling and multithreading

Practical Program List

1. Program on typecasting
2. Program on branching and looping statements
3. Program on class, objects, field and method
4. Program on method overloading
5. Program on Constructor and constructor overloading
6. Program on Array

7. Program on Collection
8. Program on Inheritance
9. Program on Packages
10. Program on abstract class
11. Program on interface
12. Program on Exception Handling and user defined exception
13. Program on multithreading

Course Outcomes:

1. To study Basic Java Programs
2. To Implement Class, object and methods in Java
3. To study use of Array, collection of Java
4. To implement the Inheritance, packages and interfaces.
6. To use of the Exception handling and multithreading

Java Reference Books:

1) Herbert Scheldt, Java2: The Complete Reference, Tata McGraw-Hill
2) Object Oriented Programming with JAVA Essentials and Applications, McGraw-Hill
3) Core and Advanced Java, Black Book - dreamtech
4) Programming with JAVA- E Balagurusamy

B.Sc. Part III: Computer Science (Entire)

BCSET-502: C# Programming

Course Objectives: - Student will be able to …

1. To study basic concepts of Dot net Framework.
2. To study the basic concepts C#.
3. To study the C# Object oriented concepts.
4. To understand Windows Applications.

Credits=2	**SEMESTER-V** **BCSET-502: C# Programming**	**No. of hours per unit/ credits**
UNIT I	**Dot Net Framework:**	**(9)**
	Overview, component Architecture of .Net framework, Features of .NET, Evolution of .net framework , Meta data and assembly , CLR, Managed and unmanaged code , MSIL, JIT Compiler, CTS, CLS , Compilation and execution process, NET base classes, namespace.	

UNIT II	**C# Basics**	**(9)**
	Introducing C#, Inside a C# Program, Compilingand Running the Program, Variables,Datatypes, The Main() Method, Multiple Main() Methods, defining & using functions & its scope, Passing Arguments to Main(),Parameterpassing technique, ConsoleI/O, Classes and Structs, Class Members, Data Members, Function Members,read-only Fields, The Object Class, System.Object Methods, The ToString() Method	
UNIT III	**C# Object Oriented Concepts**	**(9)**
	Class, Object, Inheritance, Types of Inheritance, Implementation Inheritance, Abstract Classes and Functions Sealed Classes and Functions, Constructors, Interfaces, Defining and Implementing Interfaces,Polymorphism, Method overloading, Operator overloading	
UNIT IV	**Windows base application**	**(9)**
	Creating a Windows Form Application, Standard Controls and Components, Properties and Events of the controls, Forms, Form Class, Multiple Document Interface (MDI),Custom Controls (user Controls)	

Course Outcomes: - student will be able to

1. Understand working of .Net Framework
2. Demonstrate concept of object oriented programming using C#
3. Study importance and applications of exceptionhandling
4. Understand working of file handling in C#.

Reference Books: –

1. C# 4.0 The Complete Reference Schildt McGraw Hill
2. Inside C# - By Tom Archer, Andrew Whitechapel (MicrosoftPub)
3. Programming in C#- EBalagurusamy

Lab Course: BCSEP 508: Lab course based on BCSET 501and BCSET 502

Lab Course: Lab course based on BCSET 502

Practical Program List

BCSET 502- C# programming

Course Objectives: Student will be able …

1. To study the concept of parameter passing mechanism
2. To study concept of command line argument, typecasting
3. To study control structure, looping statement
4. To study array, statics, non-static , DLL ,EXE concepts
5. To study concept of Inheritance, Interface

Practical Set:

1. Practical on .Net Framework study and comparison.
2. Program on Variables and Data Types.
3. Program on Parameter passing.
4. Program on Class and Object.
5. Program on Inheritance.
6. Program on Constructor, Interface and Polymorphism
7. Program on Windows Applications.
8. Program on MDI application.

Course Outcomes: Student should be able …

1. To implement the concept of parameter passing mechanism
2. To use of command line argument, typecasting in C#
3. To implement the use of control structure, looping statement
4. To use the concept of array, statics, non static , DLL ,EXE concepts
5. To implement the concept of Inheritance, Interface

Reference Books:

1. C# 4.0 The Complete Reference Schildt McGrawHill
2. Inside C# - By Tom Archer, Andrew White chapel(MicrosoftPub)
3. Programming in C#-E Balagurusamy

B.Sc. Part III: Computer Science (Entire)

BCSET-503: PHP Part – I

Course Objectives: - Student will be able to …

1. Develop Programming logic in PHP.
2. Learn basic programming in 'PHP'.
3. Develop skills for writing programs of control structure and looping structure using 'PHP'.
4. Learn skill of array and function concepts using 'PHP'

Credits=2	**SEMESTER-V** **BCSET-503:PHP Part – I**	**No. of hours per unit/ credits**
UNIT I	**Introduction to PHP**	**(9)**
	Introduction. Applications of PHP, Benefits of using PHP MYSQL, PHP Scripts Work, PHP syntax, First PHP Program, Embed PHP in HTML / HTML in PHP, Data Types ,variables, PHP Constants type Casting, operators, PHP strings Installation of PHP	
UNIT II	**Control Structure and Looping**	**(9)**
	If Statement, If……Else statement, If…if else Statement, Nested if statement, Switch statement For loop, while loop, Do……while loop, For each loop	
UNIT III	**Arrays in PHP**	**(9)**
	Types of Arrays Indexed Arrays, Associative arrays, Multidimensional arrays , Sorting Arrays , Displaying contents of an Arrays in HTML table	
UNIT IV	**Function In PHP**	**(9)**
	Function Definition, Syntax, Conditional Functions , Functions with parameters , Function with Relive in Values , Assigning Default values to function parameters , Functions with static variables , Passing Array to A Function and returning list , Nested Functions , Recursive functions , Anonymous Functions , Dynamic Function Calls , Call Back functionPassing array to function, Nested Function, Recursive Function, Anonymous Functions	

Course Outcomes: - After completion of this course student will be able to

1. Identify basic PHP syntax, Create basic PHP scripts
2. Apply variables, string, and constant to a PHP script
3. Identify Control and looping structures in PHP.
4. Identify Array and Functions in PHP.

Reference Books: –

1) Dr. Poornima G. Naik, Dr. Kavita S. Oza, PHP Concepts Unleashed For Novice– Vol I & II, Evince Publishing. 2018

2) Matt Doyle, Beginning PHP5.3, Wiley India Edition,2012.

3) PHP6 and MySQL, Steve Sue hiring, Tim Converse and Joyce Park, Wiley India 2010,Second Edition Vikram Vaswani, PHP:A Beginners guide, Tata McGraw Hill, 2009

Lab Course BCSEP 509: Lab course based on BCSET 503 and BCSET 504

Lab Course: Lab course based on BCSET 503

Practical Program List

BCSET 503- PHP Part I

Course Objectives:

1) To study concept of PHP with HTML

2) To study type casting, constant in PHP

3) To study the concept of If, Switch, For, While in PHP

Practical Program List

1. Program on operators
2. Program on Embedding PHP within HTML
3. Program on Type casting , Program on Constants
5. Program on if and if…else statement , Program on if…elseif…else statement
6. Program on Switch…case statement
8. Program on for loop and for. Each loop
9. Program in while and do. While loop
10. Program on Array
11. Program on Function

Course Outcomes:

1) Able to implement the use of PHP with HTML

2) Able to use type casting, constant in PHP

3) Able to implement the concept of If, Switch, For, While

Reference Books:

1) Dr. Poornima G. Naik, Dr. Kavita S. Oza, PHP Concepts Unleashed For Novice– Vol I & II, Evince Publishing. 2018

2) Matt Doyle, Beginning PHP5.3, Wiley India Edition,2012.

3) PHP6 and MySQL, Steve Sue hiring, Tim Converse and Joyce Park, Wiley India 2010,Second Edition Vikram Vaswani, PHP:A Beginners guide, Tata McGraw Hill, 2009

B.Sc. Part III: Computer Science (Entire)

BCSET-504: Fundamentals of Data Science

Course Objectives: Student should be able …

1. To understand the recommendation system and two basic architectures for a recommendation system.
2. To develop the fundamental knowledge and understand concepts to become a data science professional.
3. To learn statistical methods and machine learning algorithms required for Data Science
4. To visualize data and use for communicating stories from data.
5. To study different types of recommendation systems.

Credits=4	**SEMESTER-V** **BCSET-504: Fundamentals of Data Science**	**No. of hoursper unit/ credits**
Credit –I UNIT I	**Introduction to Data Science**	**(9)**
	What is Data Science , importance of data science, Big data and data Science, The current Scenario, Industry Perspective Types of Data: Structured vs. Unstructured Data, Quantitative vs. Categorical Data, Big Data vs. Little Data, Data science process, Role Data Scientist	
Credit –1 UNIT II	**Machine Learning Algorithms**	**(9)**
	Machine Learning Algorithms: Linear Regression, K-nearest Neighbors (k- NN), K-mean, Spam Filters, Naive Bayes, and Wrangling : Naive Bayes, Comparing Naive Bayes to k-NN, Scraping the Web: APIs and Other Tools	
Credit –1 UNIT III	**Data Visualization**	**(9)**
	Data visualization: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Map ping variables to encodings, Visual encodings	
Credit –1 UNIT IV	**Social Network Analysis**	**(9)**
	Social Networks as Graphs, Varieties of Social Networks, Graphs With Several Node Types, Clustering of social-Network Graphs: Distance Measures for Social-Network Graphs, Applying Standard Clustering Methods, Betweenness, The Girvan-Newman Algorithm, Using Betweenness to Find Communities	

Course Outcomes:

1. Student should will be able to
2. Apply data science processes to an e-commerce data and demonstrate the use of estimation methods for analyzing this data.
3. Compare and apply appropriate machine learning algorithms for classification.
4. Compare and choose one data visualization method for effective visualization of data.
5. Design a model of recommendation system based on the content of the data.
6. Apply standard clustering methods to analyze social network graph.

Text Books:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1,Cambridge University Press.

Reference Books:

1. LauraIgual and Santi Segui, Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications, Springer; 1st ed. 2017 edition

Lab Course BCSEP 509: Lab course based on BCSET 503 and BCSET 504
Lab Course: Lab course based on BCSET 503
Practical Program List
BCSET 504- Fundamentals of Data Science

Credits=4	**SEMESTER-V** **Lab Course on Fundamentals of Data Science**	**No. of hoursper unit/ credits**
	List of Experiments: 1. Create two databases either on single DBMS and Design Database to fragment and share the fragments from both database and write single query for creating view. 2. Create two databases on two different computer systems and create database view to generate single DDB. 3. Create various views using any one of examples of database and Design various constraints. 4. Using any of example, write various Transaction statement and show the information about concurrency control [i.e., various locks from dictionary] by executing multiple update and queries. 5. Using Transaction /commit rollback, Show the transaction ACID properties. 6. Write java JDBC program and use JTA to show various isolation levels in transaction. 7. Implement Two Phase Commit Protocol 8. Case study on noSQL 9. Case study on Hadoop, MongoDB	

B.Sc. Part III: Computer Science (Entire)

BCSET-505: Software Project management.

Course Objectives: - Student should be able…

1.Software Metrics and Project Management covers skills that are required to ensure successful medium and large-scale software projects.

2. It examines Requirements Elicitation, Project Management, Verification &Validation and Management of Large Software Engineering Projects.

3. Students learn to select and apply project management techniques for process modeling, planning, estimation, process metrics and risk management; perform software verification and validation using inspections, design, and execution of system testcases.

Credits=2	**SEMESTER-V** **BCSET-505: Software Project management.**	**No. of hours per unit/ credits**
UNIT I	**Introduction to Project Management**	**(9)**
	Introduction , Project management, Project phases and project life cycle, Organizational structure, Qualities of Project Manager, WBS.	
UNIT II	**Project Management Components and Time management**	**(9)**
	Project Integration Management-Project plan development and execution, Change controls, CCB Configuration management. Activity planning, Schedule development and control, GANTT Chart.	
UNIT III	**Cost Management and Quality Management**	**(9)**
	Cost estimation and Control, COCOMO model, BASIC COCOMO NUMERICALS. Quality planning and assurance	
UNIT IV	**Human Resource Management, Communication Management, Risk Management and Procurement Management**	**(9)**
	Organizational planning, Staff acquisition, Information distribution, Reporting, Risk identification Quantification and control, Solicitation management and control , Contract administration .	

Course Outcomes: - Student will be able to…

1. Improving skill of Project Management
2. Ability to understand Project management components and Timemanagement.
3. Ability to study Cost management and Qualitymanagement.
4. Ability to study HRM, Communication Management, Risk Management and Procurement management.

Reference Books: –

1) Software Engineering - Roger Pressman -McGraw-Hill
2) Software Metrics for Project Management and process improvement - Robert B. Grady - Prentice hill

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B.Sc. Part III: Computer Science (Entire)

BCSET-506: Machine Learning Part-I

Course Objectives: - Student will be able …

1. To study basic concepts of Machine Learning.
2. To study the Aspects of Machine Learning.
3. To study the Machine Learning Modeling.
4. To understand the Basic probability and terms.

Credits=2	**SEMESTER-V** **BCSET-506: Machine Learning Part-I**	**No. of hours per unit/ credits**
UNIT I	**Introduction to Machine Learning**	**(9)**
	Introduction, Evolution of machine learning, Difference between AI and Machine learning, Developments in machine learning, Introduction to K-nearest neighbor method, different phases of predicative modeling	
UNIT II	**Aspects of Machine Learning**	**(9)**
	Definition of learning System, Goals and applications of machine learning Aspects of developing a learning system: training data, concept representation, function approximation.	
UNIT III	**Machine Learning Modeling**	**(9)**
	ML Modeling flow, How to treat Data in ML, Types of machine learning, performance measures, Bias- Variance Trade-Off, Overfitting & Underfitting, Bootstrap, Sampling, Bagging Aggregation	

UNIT IV	**Basic Probability and terms**	**(9)**
	Rules of probability, permutations and combinations, Bayer's theorem, Descriptive statistics, compound probability, conditional probability	

Course Outcomes: - Student will be able to…

1. Develop an appreciation for what is involved in learning models from data.
2. Understand a wide variety of learning algorithms.
3. Understand how to evaluate models generated from data.

Reference Books: –

1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition
2. DAN.W. Patterson, Introduction to A. I and Expert Systems–PHI,2007.
3. Rich&Knight,ArtificialIntelligence–TataMcGrawHill,2ndedition,1991.

B.Sc. Part III: Computer Science (Entire)

BCSET-507: SECC 1- Numerical Skill in Computer Science(Entire) Software Testing (Manual and Automated)

Course Objectives: - Student will be able …

1. To learn major concepts of the testing methodologies.
2. To know different approaches to Testing.
3. To understand of the types of testing.
4. To plan and create test plan

Credits=2	**SEMESTER-V** **BCSET-507: Numerical Skill in Computer Science(Entire) Software Testing (Manual and Automated)**	**No. of hours per unit/ credits**
UNIT I	**Manual Testing**	**(9)**
	Introduction, Goal of Manual Testing,Types of Manual Testing, How to Perform Manual testing, Testing Different Domains: Web Application Testing, Banking Domain Application Testing, eCommerce Testing, HealthCare Domain Testing, IoT Testing Tutorial.	
UNIT II	**Automation Testing**	**(9)**
	Introduction, Difference between Manual and Automated Testing, Advantages and Disadvantages of Automation testing, Automation Tools, History of Selenium, Why Selenium tool, Differences between Selenium and other Tools , Different components in Selenium.	

Course Outcomes: - Student will be able to

1. Implement the Manual Testing and Automation testing
2. Design Manual Test Case Plans and Automation Test Case Plan
3. Test the application using Manual and Automation Testing

Reference Books: –

1. The Art of Software Testing 3rd Edition- Glenford J. Myers, Corey Sandler, Tom Badgett
2. Software Testing, 2nd Edition, 2005- Ron Patton
3. Software Testing: A Craftsman's Approach, Fourth Edition- Paul C. Jorgensen

B.Sc. Part III: Computer Science (Entire)

BCSET-601: Advanced Java Programming

Course Objectives: Student will be able …

1. To study the concepts of AWT (Abstract Window Toolkit).
2. To Understand Java Database Connectivity.
3. To Understand Servlet concepts.
4. To Study and Design Java Server Pages.

Credits=2	**SEMESTER-VI** **BCSET-601: Advanced Java Programming**	**No. of hours per unit/ credits**
UNIT I	**Abstract Window Toolkit (AWT) and swing**	**(9)**
	Abstract Window Toolkit (AWT), Concept, Components used in AWT, AWT controls and layout managers, Swing, Concept, MVC architecture, Component of swing: JFrame, JComponent, JLable, JTextfields, J Checkbox, JPanel, JRadiobuttons, JTabbed Pane, JButton, JTree, JTable, JMenu, Difference between AWT and Swing	
UNIT II	**Java Database Connectivity (JDBC)**	**(9)**
	Introduction, Types of Drivers, JDBC program: Connection, Statements, Result Set, Simple program, Executing commands and SQL queries.	
UNITIII	**Servlet**	**(9)**
	Introduction of servlet: How servlet work, installation, model diagram, Uses of servlet, Life cycle of servlet, Servlet API: packages- javax.servlet and javax.servlet.http, Session, cookies: types, advantages and disadvantages, servlet jdbc	
UNIT IV	**Java Server Page (JSP)**	**(9)**
	Concept, Life cycle methods in JSP, JSP Vs. Servlet, Components of JSP: Directives, Tags, Scripting Elements, Implicit objects of JSP, connecting to database, Simple application using JSP.	

Course Outcomes: Student should be able to …

1. Improving skill about AWT.
2. Design and implement JDBC.
3. Develop servlet concepts.
4. Design and develop and implement JSP.

Reference Books:

1) Herbert Scheldt, Java2: The Complete Reference, Tata McGraw-Hill
2) Object Oriented Programming with JAVA Essentials and Applications, McGraw-Hill
3) Core and Advanced Java, Black Book-dreamtech
4) Programming with JAVA-EBalagurusamy

Lab Course: BCSEP 608: Lab course based on BCSET 601 and BCSET 602

Practical Program List

BCSET 601- Advance Java Programming

Course objectives: Student will be able …

1. To study the concept of Swing
2. To study the concept of AWT
3. To study the Data connectivity in java
4. To study the cookies and Session
5. To study the Development of simple JSP Program and Applications

Practical Program List

1. Program on Swing
2. Program on AWT
3. Program on Database Connection
4. Program on cookie and Session
5. Program on Servlet and Servlet JDBC
6. Program on JSP and Simple application using JSP.

Course Outcomes: Student should be able…

1. To implement the concept of Swing
2. To implement the concept of AWT
3. To implement the Data connectivity in java
4. To develop the cookies and Session
5. To design the Development of simple JSP Program and Applications

Reference Books:

1) Herbert Scheldt, Java2: The Complete Reference, Tata McGraw-Hill
2) Object Oriented Programming with JAVA Essentials and Applications, McGraw-Hill
3) Core and Advanced Java, Black Book-dreamtech
4) Programming with JAVA-EBalagurusamy

B.Sc. Part III: Computer Science (Entire)

BCSET-602: C# Programming - II

Course Objectives: - Student will be able …

1. To study the basic concepts of Exception handling
2. To Understand concepts of ASP.Net.
3. To study server controls and Database connectivity.
4. To Study ASP.Net state management.

Credits=2	**SEMESTER-V** **BCSET-602: C# Programming - II**	**No. of hours per unit/ credits**
UNIT I	**Exception Handling and Threading**	**(9)**
	Try, catch, throw, finally, Nested try, Custom exception, What is threading?, Applications with Multiple ,Threads, Thread Priorities, Synchronization	
UNIT II	**Introduction to ASP.Net:**	**(9)**
	Web browser, web server , HTTP request response structure , HTML form elements, GET/POST method , Client side and Server side programming. , Web form life cycle, page events, Visual studio IDE.	
UNIT III	**Server Controls and Database connectivity:**	**(9)**
	Textbox, Listcontrols, Linkbutton, Imagemap, Image, Imagebutton, FileUpload Calender, Literal control, Radiobutton, Checkbox Validation Controls , Navigation controls- Menu, TreeView, SiteMapPath , Master Page, Sitemap, Sitemap Datasource , Database: Connections, command, Data adapters, and datasets, name spaces , Connection to database using MS-Access, SQL Server	
UNIT IV	**Asp.Net State Management:**	**(9)**
	Cross page postback property of button , Response.Redirect, Server.transfer, Response.Write , Client Side: Hiddenfield control, View State, Cookies , Server Side: Session, Application, Global.asax.	

Course Outcomes: - Student will be able to

1. Improving skill of basics exception handling
2. Understand ASP.Net concepts.
3. Study, design and develop database connectivity using server controls.
4. Study and implement state management.

Reference Books: –

1. C# Complete Reference-Tata MacGraw Hill
2. C#.NET Black Book – Steve Holzner
3. Pro ADO.NET with C#.NET – SahilMailk and Paul Dickinson

Lab Course: BCSEP 608: Lab course based on BCSET 601 and BCSET 602

Practical Program List

BCSET 602- C# Programming - II

Course objectives: Student will be able …

1. To study the concept of Server control
2. To study the concept SQL Database
3. To study the Data connectivity in C#
4. To study the state management cookies and Session
5. To study the Development of simple ASP Program and Applications

Practical Based on BCSET-602

1. Program on server controls
2. Program on SQL DataSource.
3. Program on data controls
4. Program on ADO.Net connected architecture.
5. Program on ADO.Net disconnected architecture
6. Program on Response. Redirect.
7. Program on cross page posting.
8. Program on client-side state management.
9. Program on server-side state management.
10. Program to design master page for university website.

Course Outcomes: Student should be able…

1. To implement the concept of Server control
2. To implement the concept of SQL Database
3. To implement the Data connectivity in C#
4. To develop the state management, cookies and Session
5. To design the Development of simple ASP Program and Applications

B.Sc. Part III: Computer Science (Entire)

BCSET-603: PHP Programming II

Course Objectives: Student will be able …

1. To study the concepts of Object-oriented Programming in PHP.
2. To Understand Exception handling in PHP.
3. To Study, design, and develop applications in PHP using MySQL.
4. To Study, Web development in PHP

Credits=2	**SEMESTER-VI** **BCSET-603: PHP Programming II**	**No. of hours per unit/ credits**
UNIT I	**PHP OOPS**	**(9)**
	Introduction, Declaring class, objects, constructor, destructor, Inheritance, Polymorphism, Abstract method and class, Interface.	
UNIT II	**MySQL**	**(9)**
	Introduction to Databases, Installation, Connection with MySQL, Create MySQL database, Creating database, Creating tables, Inserting values in table, Displaying, changing, searching, deleting records from the table	
UNIT III	**Web Development in PHP**	**(9)**
	Static and dynamic web pages , Communication between HTML and PHP , Difference between get and post requests , HTML Special chars() function ,Guidelines in Designing a form ,Form validation , Handling Multi- Valued form fields, Uploading a file in PHP.	
UNIT IV	**Applications in PHP**	**(9)**
	Website application: Login application, Registration application, Stock information etc Use cookie and Session.	

Course Outcomes: Student will be able to…

1. Develop PHP program using oops concept.
2. Develop PHP program using Exception Handling.
3. Improving skill of connecting database using PHP.
4. Design and develop Project.

Reference Books:

1. PHP and MySQL By Dreamtech Publications
2. PHP 5.1 for Beginners – By Ivan Bayross and Sharanam Shah(Shroff Publishers & Distributors)
3. Beginning PHP 6, Apache, MySQL Web Development- By Timothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Zeremy Stolz, Michael K.Glass
4. PHP and MySQL by Rajendra Salokhe (Aruta Publications)

Lab Course BCSEP 609 Based on BCSET-603 and BCSET 604
Practical Program List
BCSET603-PHP Programming II

Course objectives: Student will be able …

1. To study the concept of user defined function
2. To understand the concept of object oriented in PHP
3. To study the form validation in PHP
4. To understand the Data connectivity and Database operations in PHP

Practical Program List

1. Program on user defined function.
2. Program on Constructor and Destructors.
3. Program on Inheritance
4. Programs on Polymorphism
5. Program to create static and dynamic web page using PHP.
6. Program on form validation in PHP
7. Program on Data Connectivity.
8. Program based on Database Operations using MySQL.

Course Outcomes: Student will be able …

1. To implement the concept of user defined function
2. To use the concept of object oriented in PHP
3. To implement the form validation in PHP
4. To implement the Data connectivity and Database operations in PHP

Reference Books:

1. PHP and MySQL By Dreamtech Publications
2. PHP 5.1 for Beginners – By Ivan Bayross and Sharanam Shah (Shroff Publishers & Distributors)
3. Beginning PHP 6, Apache, MySQL Web Development- By Timothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Zeremy Stolz, Michael K. Glass

BCSET- 604: Internet of Things (IOT) for Data Science

Learning Objectives: students will be able:

1. To gain knowledge on basic functioning of sensors and display units.
2. To familiarize the concepts of signal processing and converting elements.
3. To understand basic operation in digital systems.
4. To acquire the knowledge of microcontrollers.
5. To understand communication Systems.

Credits (Total Credits 2)	**SEMESTER-I** **BCSET- 505: Internet of Things (IOT)**	**No. of hours per unit/ credits**
Unit I	**SENSORS FOR DATA**	**(9)**
	Sensors and Transducers – Classification, Potentiometer, Strain Gauge, Piezoelectric Sensor, Linear Variable Differential Transformer (LVDT), Resistance temperature detectors (RTD), Thermocouples, Displays - LCD, Light Emitting Diode (including OLED) displays.	
Unit II	**SIGNAL CONDITIONING AND DATA LOGGING**	**(9)**
	Operational Amplifiers- Inverting, Non-Inverting, Instrumentation Amplifier, Active filters: - Low pass, High pass filter, Analog to Digital Converter – Successive Approximation, Digital to Analog Converter – R-2R ladder. Data Logging.	
Unit III :	**DATA PROCESSING DEVICES**	**(9)**
	Analog and Digital signals, Number systems - Decimal, Binary, Hexadecimal, Interconversion of number system. Logic gates-AND, OR, NOT, NOR, NAND, EX-OR. Comparison of Microcontroller & Microprocessor, 8 Bit, 16 Bit, 32 Bit microcontrollers, Study of 8051 and its Family (89C51, DS5000, 89C51VRD2). Architecture of 8051, Memories, I/O Ports.	
Unit IV	**DATA COMMUNICATION SYSTEM**	**(9)**
	Wireless Technology: Bluetooth, Wi-Fi, Wi-Max. Communication System: Global Positioning System, Mobile Communication, Satellite Communication (Qualitative Idea).Protocols for Communication.	

Course Outcomes: - Students will be able to:

1. Understand the operation/working of Transducer and sensor.
2. Understand Signal conditioning and Operational amplifier.
3. Understand number system and Design and construct logic gates.
4. Student will able to understand basics of 8051microcontroller.
5. Understand wireless technology and communication systems.

Reference Books:

1. Electronic Instrumentation, H.C. Kalsi, McGraw Hill (India) Pvt. Ltd. New Delhi, Twelfth Edition,2014
2. OP-AMP and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning Pvt. Ltd. Delhi, Fourth Edition, 2014
3. Digital System Design, M. Morris Mano, Pearson Education Delhi, 2010
4. The 8051 Microcontroller and Embedded Systems, Muhammad A. Mazidi, J.G. Mazidi, R.D. Mckinlay, Pearson India Education Services Pvt. Ltd., Seventeenth Edition, 2017
5. The 8051 Microcontroller, Kenneth Ayala, Cengage Learning India Pvt. Ltd., Third Edition, 2014.
6. Communication Systems, Simon Heykin, Wiley Pvt. Ltd., Third Edition, 2016.

Lab Course BCSEP 609 Based on BCSET-603 and BCSET 604

Practical Program List

BCSET 604- Internet of Things (IOT) for Data Science

Course objectives: Student will be able …

1. To study the concept of Sensor
2. To understand the concept OP-AMP
3. To study the R-2R , Logic gates
4. To understand the 8051 and its operation

Practical Set :

1. Study of Temperature sensor using LM-35.
2. Study of OP-AMP as an adder.
3. Study of Instrumentation amplifier using OP-AMP
4. Study the R-2R ladder D/A convertor.
5. Study the Logic gates.
6. Study the Arithmetic operation using 8051
7. Study the logical operation using 8051
8. Demonstrate the wireless technologies.
9. Demonstrate the communication systems.

Course objectives: Student will be able …

1. Use the concept of Sensor in LM-35
2. Design OP-AMP as adder
3. Develop the arithmetic operations using OP-Amp
4. Use the 8051

B.Sc. Part III: Computer Science (Entire)

BCSET 605 -: Android Programming

Course Objectives: - Student will be able to …

1. Understand the Android Operating System
2. Learn basic principles of programming.
3. Develop applications using Google's Android open-source platform.
4. Study Database in Android application

Credits=2	**SEMESTER-V** **BCSET 605 -: Android Programming**	**No. of hours per unit/ credits**
UNIT I	**Introduction to Android**	**(9)**
	Overview and History, Features of Android, Architecture of Android, Overview of Stack, Linux Kernel, Native Libraries, Android Runtime, Application Framework, Applications, SDK Overview, Platforms, Tools – (JDK, SDK, Eclipse/Android Studio, ADT, AVD, Android Emulator), Versions, Creating your first Android Application	
UNIT II	**Activities, Fragments, and Intents**	**(9)**
	Introduction to Activities, Activity Lifecycle, Introduction to Intents, Linking Activities using Intents, calling built-in applications using Intents, Introduction to Fragments, Adding Fragments Dynamically, Lifecycle of Fragment, Interaction between Fragments	
UNIT III	**Android User Interface and Designing**	**(9)**
	Understanding the components of a screen, Views and View Groups, Scroll View, Anchoring Views, Types of Layouts, Adapting to Display Orientation, Resizing and Repositioning, Managing Changes to Screen Orientation, Persisting State Information during Changes in Configuration, Controlling the Orientation of the Activity, Utilizing Action Bar, Customizing the Action Items and Application Icon, Different types of Buttons, Understanding Specialized Fragments	

UNIT IV	**Databases – SQLite**	**(9)**
	Introduction to SQLite, SQLite Open Helper and SQLite Database, Creating, opening, and closing database, working with cursors, Insert, Update, Delete, Building and executing queries	

Course Outcomes: - Student will be able to…

1. Identify basic Android syntax
2. Create basic Android scripts
3. Use Android Interface to design application
4. Design Database for Android Application

Reference Books: –

1. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication
2. Professional Android 4 Application Development, By Reto Meier WROX Publication 3. The official site for Android developers - https://developer.android.com

Lab Course BCSEP -609 Based on BCSET 605

BCSET 605 -: Android Programming

Course Objectives: Student will be able to …

1. To study concept of Android Studio.
2. To study type of Android Interface
3. To Understand Android Application designing
4. Study Database and use in Android Application

Practical Program List

1. Install Android Studio and build simple Hello World application.
2. Design Login Activity
3. Create application to display details of selected list item on second activity (Use Fragmentation).
4. Create first activity to accept information like first name, last name, date of birth, email-id and display all information on second activity when user click on submit button.
5. Create application to calculate GPA
6. Create the simple calculator shown below. Also, perform appropriate operations.

7. Create a custom "Contact" layout to hold multiple pieces of information, including: Photo, Name, Contact Number, E-mail id

8. Create application to demonstrate date and time picker.

9.Create tables: Course (id, name, instructor) and Student (id, name). Course and Student have a many to many relationships. Create a GUI based system for performing the following operations on the tables: 1. Course: Add Course, View All students of a specific course 2. Student: Add Student, Delete Student, View All students, Search student.

Course Outcomes: Student will be able to

1) Implement the concept of Android Studio.
2) Design the buttons.
3) Use Android Interface to design application
4) Design Database for Android Application

Reference Books:

1. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication

2. Professional Android 4 Application Development, By Reto Meier WROX Publication 3. The official site for Android developers - https://developer.android.com

B.Sc. Part III: Computer Science (Entire)

BCSET-606: Machine Learning Part II

Course Objectives: - Student will be able …

1.To study the concepts of instance-based learning.
2.To Understand clustering and unsupervised learning.
3.To study and design artificial neural network.
4.To Study the genetic algorithms.

Credits=2	**SEMESTER-V** **BCSET-606: Machine Learning Part II**	**No. of hours per unit/ credits**
UNIT I	**INSTANCE BASED LEANING**	**(9)**
	Introduction, K nearest neighbor learning, case-based learning, radial basis functions	
UNIT II	**CLUSTERING & UNSUPERVISED LEARNING**	**(9)**
	Learning from unclassified data. Clustering. Hierarchical Agglomerative Clustering. K means partitional clustering. Expectation maximization (EM) for soft clustering. Semi supervised learning with EM using labeled and unlabeled data.	
UNIT III	**ARTIFICIAL NEURAL NETWORK**	**(9)**
	Introduction, neural network representation, problems for neural network learning, perceptions, multilayer network & Back propagation Algorithm	
UNIT IV	**GENETIC ALGORITHMS**	**(9)**
	Introduction, genetic operators, genetic programming, models of evolution & learning, parallelizing genetic algorithm	

Course Outcomes: The students should be able to:

1. Define instance-based learning.
2. Understand clustering and unsupervised learning.
3. Study artificial neural network.
4. Understand generic algorithm.

References:
1. Tom M. Mitchell. "Machine Learning" McGraw-Hill, 1997.
2. P. Langley. "Elements of Machine Learning" Morgan Kaufmann Publishers, Inc. 1996.
3. EthemAlpaydin "Introduction to machine learning ".

B.Sc. Part III: Computer Science (Entire)

SECCCST607: Entrepreneurship Development

Course Objectives: - Student will be able…

1.To study the product design and development process
2.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

Credits=2	**SEMESTER-V** **SECCCST607: Entrepreneurship Development**	**No. of hours per unit/ credits**
UNIT I	**Business Finance & Accounts**	**(9)**
	Business Finance- Cost of Project Sources of Finance Assessment of working capital Product costing Profitability Break Even Analysis Financial Ratios and Significance Business Account- Accounting Principles, Methodology Book Keeping Financial Statements Concept of Audit. Business Plan Business plan steps involved from concept to commissioning, Activity Recourses, Time, Cost Project Report Meaning and Importance, Components of project report/profile (Give list), Project Appraisal: 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	
UNIT II	**Enterprise Management and Modern Trends**	**(9)**
	Enterprise Management- Essential roles of Entrepreneur in managing enterprise Product Cycle: Concept and importance Probable Causes of Sickness Quality Assurance: Importance of Quality, Importance of testing E-Commerce: Concept and Process Electronics Entrepreneur- Assess yourself-are you an entrepreneur? Prepare project report for electronics and study its feasibility.	

Course Outcomes: - After completion of this course student will be able to

1. Able to identify feasibility of product design and development.
2. Able to get the idea about IP rights.
3. Avail the financial and marketing skill.
4. Able to prepare the proposal for small scale industry.

Reference Books: –

1.R. G. Kaduskar, V. B. Baru. Electronic Product Design. Second edition Wiley India

2.G. N. Pandey. A complete guide to successful Entrepreneurship, Vikas publisher,1994.

3.Entrepreneurship, Alpana Trehan, Wiley India Publishers, (1st Ed.) 2011.

4.Complete guide to successful Entrepreneurship, G.N.Pande, S.Chand (G/L) & Company Ltd ., 1994.