

Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.
SYLLABUS STRUCTURE OF
S.Y.BBA (CA) (2019 Pattern)
Bachelor of Business Administration (Computer Application)

Syllabus (CBCS Pattern) under Academic Autonomy for the year 2020-2021

Semester –III (w. e. f. A.Y. 2020-2021)

Subject Code	Name of Subject	Marks			Credit
		Int.	Ext.	Total	
BCA2301	Java Programming	40	60	100	03
BCA2302	Web Technologies	40	60	100	03
BCA2303	Python Programming	40	60	100	03
BCA2304	Operating System	40	60	100	03
BCA2305	Business Statistics using R Programming	40	60	100	03
BCA2306	Computer Laboratory based on (BCA2301, BCA2302)	40	60	100	02
BCA2307	Computer Laboratory based on (BCA2303, BCA2305)	40	60	100	02
Certificate Course		-	-	-	02
Environmental Study (EVS)		-	-	-	02
Total		280	420	700	23

BBA (C.A) Programme Outcome

PSO1. Knowledge: To understand and apply the fundamental principles, concepts, and methods in diverse areas of computer science, computer applications, management, mathematics, statistics, etc.

PSO2. Problem Analysis: Identify, analyse and formulate complex real-life computing problems. Attain substantiated conclusions to solve the problems using fundamental principles of computer science and application domains by using various tools and emerging technologies.

PSO3. Design and Development: Design and develop efficient solutions for complex real-world computing problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and the cultural, societal, and environmental considerations.

PSO4. Conduct investigations of complex problems: Ability to research, analyze and Investigate complex computing problems through the design of experiments, analysis, and interpretation of data, and synthesis of the information to arrive at valid conclusions.

PSO5. Modern Tool Usage: Create, identify and apply appropriate techniques, skills, and modern computing tools to computing activities.

PSO6. Ethics and Social Responsibility: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

PSO7. Individual and Team Work: Ability to work effectively as an individual, and as a member or leader as per need in, multidisciplinary teams.

PSO8. Life-Long Learning: Recognize the need and have the ability to engage in independent continuous reflective learning in the context of technological advancement.

PSO9. Project Management: Understand and apply computing, management principles to manage projects.

PSO10. Communication: Able to use interpersonal skills and communicate effectively with the professionals and with society to convey technical information effectively and accurately and able to comprehend and write effective reports, design documentation, and make effective presentations.

PSO11. Innovation, employability, and Entrepreneurial skills:

Identify opportunities, and pursue those opportunities to create value and wealth for the betterment of the individual and society at large.

SYLLABUS (CBCS) FOR S.Y.BBA (C.A.) (w. e. from June, 2020)

Academic Year 2020-2021

Class : S.Y.BBA (C.A.) (Semester - III)

Paper Code : BCA2301

Title of Paper: Java Programming

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. To learn the syntax and program structures in Java Programming.
2. To understand concepts of object-oriented programming in Java.
3. To introduce the principles of inheritance and polymorphism and demonstrate how they relate to the design of abstract classes.
4. To learn Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
5. To understand how to use programming in day-to-day applications.
6. To introduce the implementation of packages and interfaces.
7. To introduce the design of Graphical User Interface using applets and swing controls.

B] Course Outcomes:

Student should be able to

- CO1.** Know the different basic concepts of Java programming language.
- CO2.** Use the Java programming use various programming technologies
- CO3.** Able to understand the use of abstract classes
- CO4.** Able to solve problems using java collection framework and I/o classes.
- CO5.** Able to develop multithreaded applications with synchronization.
- CO6.** Able to develop applets for web applications.
- CO7.** Develop software in the Java programming language.

Topics/Contents

Unit 1:	Introduction to JAVA	(08L)
	1.1 Features of Java	
	1.2 JDK Environment & tools like(java,javac, appletviewer, javadoc, jdb)	
	1.3 OOPs Concepts Class, Abstraction, Encapsulation, Inheritance, Polymorphism	
	1.4 Difference between C++ and JAVA	
	1.5 Structure of Java program	
	1.6 Data types, Variables, Operators, Keywords, Naming Convention	
	1.7 Decision Making (if, switch), Looping (for, while)	
	1.8 Type Casting	
	1.9 Array Creating an Array Types of Array -One Dimensional Arrays -Two Dimensional Arrays	
	1.10 String - Arrays, Methods, StringBuffer Class	
Unit 2	Classes and Objects	(10L)
	2.1 Creating Classes and Objects	
	2.2 Memory Allocation for Objects	
	2.3 Constructor	
	2.4 Implementation of Inheritance Simple, Multilevel,	
	2.5 Interfaces	
	2.6 Abstract Classes and Methods	
	2.7 Implementation of Polymorphism	
	2.8 Method Overloading, Method Overriding	
	2.9 Nested and Inner classes.	
	2.10 Modifiers and Access Control	
	2.11 Packages Packages Concept Creating User Defined Packages	
	2.12 Java Built in Packages java.lang->math java.util->Random, Date, Hashtable	
	2.13 Wrapper Classes	

3.1 Collection Framework.

3.1.1 Interfaces

- Collection
- List
- Set
- Sorted Set
- Enumeration
- Iterator
- List Iterator

3.1.2. Classes

- Linked List
- Array List
- Vector
- Hash Set
- Tree Set
- Hash table

3.2 Working with Maps

3.2.1 Map Interface

3.2.2 Map Classes

- Hash Map
- Tree Map

Unit 4: File and Exception Handling Exception

(10L)

4.1 Exception Types

4.2 Using Try Catch and Multiple Catch

- Nested try, throw, throws and finally

4.3 Creating User Defined Exceptions

File Handling

4.4 Stream

- Byte Stream Classes
- Character Stream Classes

4.5 File IO basics

4.6 File Operations

- Creating File
- Reading File (character, byte)
- Writing File (character, byte)

Unit 5: Applet, AWT and Swing Programming

(10L)

Applet

5.1 Introduction

5.2 Types Applet

5.3 Applet Life Cycle

- Creating Applet
- Applet tag

5.4 Applet Classes

- Color
- Graphics
- Font

AWT

5.5 Components and Container used in AWT

5.6 Layout Managers

5.7 Listeners and Adapter classes

5.8 Event Delegation Model

Swing

5.9 Introduction to Swing

5.10 Component and Container Classes

Reference Books:

1. Programming with JAVA - E Balgurusamy
2. The Complete Reference – JAVA Herbert Schildt

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										2
CO2					3						2
CO3	3										2
CO4		3	3								2
CO5			3						3		2
CO6			3					2	3		2
CO7	3		3					2	3		

PO1. Knowledge:

All of the course outcomes (COs) strongly contribute to the development of students' disciplinary knowledge in Java.

CO1 needs students to deeply understand the use of abstract classes. CO7 strongly helps to understand the basics of the abstract classes, the Java collection framework, and its implementation.

PO2. Problem Analysis:

CO4 strongly contributes as the student can solve problems using the Java collection framework and I/O classes.

PO3. Design and Development:

CO4, CO5, CO6, and CO7 strongly contributes to program outcome Design and Development as CO4 needs student to develop applets for web applications.

PO5. Modern Tool Usage:

CO2 Strongly uses various programming technologies like applet, spring, and hibernate.

CO1, CO2, CO7 Slightly mapped as students use notepad, sublime editor's web browsers, Apache web server, XAMP, MySQL for design and execute the server-side PHP scripts interacting with the database.

PO8. Life-Long Learning:

Co6 CO7 moderately contributes to recognizing the need for lifelong learning in the context of technology development.

PO9. Project Management:

CO5 CO6 CO7 contributes to the development of project development and management skills using all advanced Java tools and technology.

PO11. Innovation, employability, and entrepreneurial skills:

All Cos are moderately mapped since students can create an interface, and develop applets for web applications. Develop software in the Java programming language.

SYLLABUS (CBCS) FOR S.Y.BBA (C.A.) (w. e. from June, 2020)
Academic Year 2020-2021

Class : S.Y.BBA (C.A.) (Semester - III)

Paper Code : BCA2302

Title of Paper: Web Technologies

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. To introduce the fundamentals of Internet, and the principles of web design.
2. To learn HTML5 and CSS3 tags and JavaScript Language programming concepts and techniques.
3. To develop the ability to logically plan and develop web pages.
4. To impart the design, development and implementation of Dynamic Web Pages.
5. To develop programs for Web using Scripting Languages.
6. To learn to write, test, and debug web pages using HTML5 and JavaScript.
7. Get knowledge and skills of project-based experience needed for entry into web application.

B] Course Outcome:

Student should be able to

- CO1.** Apply critical thinking skills to analyze and solve complex problems in web development.
- CO2.** Communicate effectively through written and oral means, demonstrating the ability to document and present web development projects.
- CO3.** Students should be able to create responsive web designs.
- CO4.** Students should be able to comprehend the basic concepts of the World Wide Web, Including the client-server architecture, protocols (HTTP/HTTPS), and the role of web browsers.
- CO5.** Understand the basic syntax, data types, and control structures of JavaScript.
- CO6.** Implement smooth transitions and animations using CSS properties, enhancing user experience.
- CO7.** Create dynamic and visually appealing user interfaces using jQuery for animations, fades, slides, and other effects.

Topics/Contents

Unit 1:	Introduction to Web Development	(04L)
	1.1 What is web app	
	1.2 Client server Vs Web Server	
	1.3 Front End & Back end.	
	1.4 Internet-Basic, Internet Protocols (HTTP, FTP, IP)	
	1.5 World Wide Web (WWW)	
	1.6 HTTP Request Message, HTTP ResponseMessage	

Unit 2:**Introduction to HTML5****(12L)**

- 2.1 Introduction to HTML5, Features of HTML5, Introduction to Web 2.0 and Web 3.0
- 2.2 History And Major Actors
 - 2.2.1 A Little Retrospective
 - 2.2.2 What Is the W3C?
 - 2.2.3 What Is the WHATWG?
- 2.3 Getting Started with HTML5
 - 2.3.1 Feature Detection
 - 2.3.2 Support For Legacy Browsers
- 2.4 Structure of a Web Page
 - 2.4.1 HTML5 DOCTYPE
 - 2.4.2 Page Encoding
 - 2.4.3 New And Updated Elements
 - 2.4.4 New Attributes
 - 2.4.5 Deprecated Elements and Attributes
- 2.5 Audio and Video
 - 2.5.1 The State of Web Audio and Video Based on Plug-in
 - 2.5.2 Attributes and Methods
 - 2.5.3 Understanding Audio/Video Events
- 2.6 HTML5 Canvas
 - 2.6.1 Overview of Graphics in the Browser
 - 2.6.2 Canvas Vs. SVG
 - 2.6.3 Using a Canvas
- 2.7 Forms
- 2.8 Working with Paths
 - 2.8.1 Drawing Straight Lines
 - 2.8.2 Drawing Circles or Arcs
 - 2.8.3 Drawing Text
 - 2.8.4 Drawing Images
- 2.9 Understanding Transforms
 - 2.9.1 Translation
 - 2.9.2 Rotation
 - 2.9.3 Scaling

Unit 3:**CSS3****(10L)**

- 3.1 Introducing CSS3
 - 3.1.1 What is CSS3?
 - 3.1.2 The History of CSS
- 3.2 Selectors and Pseudo Classes
 - 3.2.1 Attribute Selectors
 - 3.2.2 The Target Pseudo-Class
 - 3.2.3 UI Element States Pseudo-Classes
- 3.3 Fonts and Text Effects
 - 3.3.1 Fonts on the Web
 - 3.3.2 Font Services
 - 3.3.3 The @font-face Rule
- 3.4 Colours, Gradients, Background Images and Masks
 - 3.4.1 Colour
 - 3.4.2 The Opacity Property
 - 3.4.3 Backgrounds

3.5 Transitions, Transforms and Animations

3.5.1 Transitions

3.5.2 Transforms

3.5.3 Animations

3.6 Embedding Media

3.6.1 Video Formats

3.6.2 Styling Video

Unit 4: JavaScript (12L)

- 4.1 Introduction to JavaScript,
Types of Scripts with suitable example
- 4.2 Control and looping structure
- 4.3 Various Operators in JavaScript with Example
- 4.4 Array and its Types
- 4.5 Event Handling with Example
- 4.6 Math, Date and String objects with Example
- 4.7 DOM Objects
- 4.8 Form Validation
- 4.9 Dynamic effect using JavaScript

Unit 5: jQuery (10L)

- 5.1 Introduction to jQuery
 - 5.1.1 Need of jQuery
 - 5.1.2 Advantages of jQuery
 - 5.1.3 jQuery Versions
 - 5.1.4 Features
- 5.2 Retrieving Page Content
 - 5.2.1 Using Selectors
 - 5.2.2 Using Filters
 - 5.2.3 Child, Visibility and Content Filters in jQuery
- 5.3 Manipulating Page Content
 - 5.3.1 Creating, Getting, and Setting Content
 - 5.3.2 Manipulating attributes
 - 5.3.3 Inserting Content
 - 5.3.4 Wrapping, Replacing and Removing Content
- 5.4 Methods in jQuery
- 5.5 Events in jQuery
- 5.6 Animation in jQuery
- 5.7 Plugins in jQuery

Reference Books:

1. JavaScript: the Complete Reference by Thomas Powell, Fritz Schneider
2. HTML & CSS: The Complete Reference, Fifth Edition by Powell Thomas
3. JavaScript The Complete Reference 3rd Edition (Paperback, Powell Thomas)
4. jQuery Reference Guide by Chaffer Jonathan
5. Introducing HTML5 - Bruce Lawson, Remy Sharp
6. HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2Ed
7. JavaScript The Complete Reference 3rd Edition (Paperback, Powell Thomas)
8. Learning jQuery - Jonathan Chaffer, Karl Svedberg

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		3									
CO2										2	
CO3			3								
CO4	3										
CO5	1										
CO6			3	2							2
CO7			3		2				2		2

PO1. Knowledge:

CO4 and CO5 strongly contribute as students are able to understand the basic syntax, data types, and control structures of JavaScript. Basic concepts of the World Wide Web.

PO2. Problem Analysis:

CO4 strongly contributes as students are able to apply critical thinking skills to analyze and solve complex problems in web development.

PO3. Design and Development:

CO3, CO6, and CO7 strongly contribute as student able to create dynamic and visually appealing user interfaces using jQuery, CSS, and HTML

PO4. Conduct investigations of complex problems:

CO6 Moderately mapped to implement smooth transitions and animations using CSS properties, enhancing the user experience.

PO5. Modern Tool Usage:

CO7 Moderately mapped to create dynamic and visually appealing user interfaces using jQuery for animations, fades, slides, and other effects.

PO9. Project Management:

CO7 is moderately mapped to the development of project development and management skills using all advance tools and technology.

PO10. Communication:

CO2 Moderately mapped Communicate effectively through written and oral means, demonstrating the ability to document and present web development projects.

PO11. Innovation, employability, and entrepreneurial skills:

CO6, CO7 Moderately mapped since students can create an interface, develop web pages for web applications. Develop software in the Web Technologies.

SYLLABUS (CBCS) FOR S.Y.BBA (C.A.) (w. e. from June, 2020)
Academic Year 2020-2021

Class : S.Y.BBA (C.A.) (Semester - III)

Paper Code : BCA2303

Title of Paper: Python Programming

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. To know the basics of Programming.
2. To construct Python programs with control structures.
3. To structure a Python Program as a set of functions
4. To use Python data structures-lists, tuples, dictionaries.
5. To do input/output with files in Python.
6. To develop problem solving skills and their implementation through Python
7. To understand and implement concept of object-oriented methodology using Python.

B] Course Outcomes:

Student should be able to

- CO1.** Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- CO2.** Design and develop Python applications.
- CO3.** Design and implement functions for code modularity, reusability, and maintainability.
- CO4.** Apply principles of OOP, including classes, objects, inheritance, encapsulation, and polymorphism, in Python programming.
- CO5.** Demonstrate proficiency in using and manipulating common data structures in Python, such as lists, dictionaries, tuples, and sets.
- CO6.** Understand and apply OOP principles, including classes, objects, inheritance, encapsulation, and polymorphism.
- CO7.** Develop, run and manipulate Python programs using Core data structures like Lists, Dictionaries, and use of Strings Handling methods.

Topics/Contents

Unit 1: Introduction to Python

(09L)

- 1.1 Getting Started: Introduction to Python-an interpreted high level language, interactive mode and script mode.
Installation of Python and IDLE (3.8 or higher)
Print Statement

Variables, Expressions and Statements

- 1.2 Variables and Types- Mutable and Immutable Variable and Keywords.
- 1.3 Operators and Operands in Python. (Arithmetic, Relational and Logical Operators),
- 1.4 Operator Precedence, Expressions and Statements (Assignment statement);
- 1.5 Taking input (using raw input () and input ())
- 1.6 Comments in Python
- 1.7 Creating, Initializing and Accessing the elements
- 1.8 String operators: +, *, in, not in , range, slice[n:m]
- 1.9 String Built-in Functions & Methods: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitle, partition, replace, join, split, count,

	decode, encode, swap case	
	1.10 Strings constants defined in string module, Regular Expression and Pattern Matching	
Unit 2:	Conditional and Looping Construct	(06L)
	2.1 Conditional Statement: if-else statement and nested if-else	
	2.2 Loop Statement: while, for, use of Range function in for, Nested loops	
	2.3 break, continue, pass statement	
	2.4 Use of Compound Expression in Conditional Constructs	
	Functions	
	2.4 Built-In Function, Invoking Built- In Functions	
	2.5 Module (Importing entire module or selected objects using from statement)	
	2.6 Functions from Math, Random, Time & Date Module.	
	2.7 Composition	
	2.8 User Defined Function: Defining, Invoking Functions, Passing Parameters (default parameter values, keyword arguments)	
	2.9 Scope of Variables, Void Functions and Functions Returning Values	
Unit 3:	Lists, Tuples, Sets & Dictionaries	(12L)
	Lists	
	3.1 Concept of Mutable Lists, Creating, Initializing and Accessing the Elements of List	
	3.2 List operations (Concatenation, Repetition, Membership, List Slices), List Comprehensions	
	3.3 List functions & Methods: len, insert, append, extend, sort, remove, reverse, pop	
	Tuples	
	3.4 Immutable Concept, Creating, Initializing and Accessing the Elements in a Tuple;	
	3.5 Tuple Functions: cmp(), len(), max(), min(), tuple()	
	Sets	
	3.6 Concept of Sets, Creating, Initializing and Accessing the Elements of Set	
	3.7 Sets Operation (Membership, Union, Intersection, Difference, and Symmetric Difference	
	Dictionaries	
	3.8 Concept of Key- Value Pair, Creating, Initializing and Accessing the Elements in a Dictionary,	
	3.9 Traversing, Appending, Updating and Deleting Elements	
	3.10 Dictionary Functions & Methods: cmp, len, clear(), get(), haskey(), items(), keys(), update(), values	
Unit 4:	Modules	(04L)
	4.1 More on Modules: Executing Modules as Scripts, The Module Search Path, “Compiled” Python Files Standard Modules	
	4.2 The dir() Function	
	4.3 Packages Importing * From a Package, Intra-Package References, Packages in Multiple Directories	
Unit 5:	I/O and File Handling	(04L)
	5.1 Output Formatting	
	5.2 Reading and Writing Files(text and binary mode)	
Unit 6:	Errors and Exceptions	(05L)
	6.1 Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions	
	6.2 User-defined Exceptions, Defining Clean-up Actions(try - finally), Predefined Clean-up Actions	

Unit 7: Introduction to Object Oriented Concepts in Python

(08L)

7.1 Object Oriented Concepts

7.2 Objects, Python Scopes and Namespaces

7.3 Classes, Class Objects, Instance Objects, Method Objects,
Class and Instance Variables

7.4 Inheritance, Polymorphism, Operator Overloading

Reference Books:

1. <https://docs.python.org>
2. Learning Python By Mark Lutz, O'Reilly Publication
3. Programming with python, A users Book, Michael Dawson, Cengage Learning
4. Python Essential Reference, David Beazley, Third Edition 5. Python Bible

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										
CO2	3		3								
CO3	3		3								
CO4				3	2						
CO5	3			3	2						
CO6	3										
CO7		2	3		2						3

PO1. Knowledge:

CO1, O2, CO3, CO5, CO6 Strongly mapped as the students need the knowledge of python syntax and semantics related to List, Dictionaries, and strings to apply them in building applications which need python programming constructs

PO2. Problem Analysis:

CO7 Moderately mapped to develop, run, and manipulate Python programs. Students are able to apply critical thinking skills to analyze and solve complex problems in web development.

PO3. Design and Development:

CO2, CO3, and CO7 strongly contribute as students who are able to design, develop, and implement Python applications.

PO4. Conduct investigations of complex problems:

CO4, CO5 Strongly mapped as the students demonstrate proficiency in using and manipulating common data structures in Python, such as lists, dictionaries, tuples, and sets.

PO5. Modern Tool Usage:

CO4, CO5, and CO7 students are moderately mapped as students learn modern IDE tools to execute Python programs and applications (Python IDLE and Anaconda with Spyder IDE).

PO11. Innovation, employability, and entrepreneurial skills:

CO7 Strongly mapped since students can create an interface set tuple for web applications.

SYLLABUS (CBCS) FOR S.Y.BBA (C.A.) (w. e. from June, 2020)
Academic Year 2020-2021

Class : S.Y.BBA (C.A.) (Semester - III)

Paper Code : BCA2403

Title of Paper: Operating System

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. To learn the fundamentals of Operating Systems and handle processes and threads.
2. To learn the mechanisms involved in memory management in contemporary OS.
3. To know the functionality of Multiprocessor OS and Mobile OS.
4. To know about Basic Administration of Linux.
5. To learn programmatically to implement Linux OS mechanisms.
6. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusive algorithms, deadlocks detection algorithm and agreement protocol.
7. To understand design issues related to File management and various related algorithms

B] Course Outcomes:

Student should be able to

CO1. Control access to a computer and the files that may be shared.

CO2. Demonstrate the knowledge of the components of computer and their respective roles in computing.

CO3. Ability to recognize and resolve user problems with standard operating environments

CO4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use effectively.

CO5. Identify different types of disk scheduling algorithms.

CO6. Understand the concepts of secondary storage structure, protection and case study of Linux operating system.

Topics/Contents	
Unit 1:	Overview (02L) 1.1 Overview of Operating Systems 1.2 Functionalities and Characteristics of OS 1.3 Hardware Concepts related to OS, 1.4 CPU States 1.5 I/O Channels.
Unit 2:	Memory Management (08L) 2.1 Memory Management Techniques 2.2 Contiguous & Non-Contiguous Allocation 2.3 Logical & Physical Memory 2.4 Conversion of Logical to Physical Address 2.5 Paging 2.6 Segmentation 2.7 Segment with Paging 2.8 Virtual Memory Concept

- 2.9 Demand Paging
- 2.10 Page Replacement Algorithm
- 2.11 Thrashing

Unit 3: Processor Management and Synchronization (13L)

- 3.1 Process Control and Management
- 3.2 PCB
- 3.3 Job and Processor Scheduling
- 3.4 Scheduling Algorithms
- 3.5 Process Hierarchies
- 3.6 Problems of Concurrent Processes
 - 3.6.1 Critical Sections
 - 3.6.2 Mutual Exclusion
 - 3.6.3 Synchronization
 - 3.6.4 Deadlock

Device Management & Information Management

Multiprocessor Operating Systems:

- 3.7 System Architectures
- 3.8 Structures of OS
- 3.9 OS Design Issues
- 3.10 Process Synchronization
- 3.11 Process Scheduling and Allocation

Mobile Operating Systems:

- 3.12 ARM and Intel Architectures
- 3.13 Power Management
- 3.14 Mobile OS Architectures
- 3.15 Underlying OS
- 3.16 Kernel Structure and Native Level Programming
- 3.17 Runtime Issues- Approaches to Power Management

Unit 4: Distributed Operating Systems (06L)

- 4.1 System Architectures
- 4.2 Design Issues
- 4.3 Communication Models
- 4.4 Clock Synchronization
- 4.5 Mutual Exclusion
- 4.6 Election Algorithms
- 4.7 Distributed Deadlock Detection Distributed scheduling
- 4.8 Distributed Shared Memory
- 4.9 Distributed File System
- 4.10 Multimedia File Systems
- 4.11 File Placement
- 4.12 Caching

- Unit 5: Basics of Linux (05L)**
- 5.1 History
 - 5.2 FOSS
 - 5.3 Current Linux Distributions
 - 5.4 Distros Examples
 - 5.5 Linux Operating System Layers
 - 5.6 The Linux Shell (different kinds of shell)
 - 5.7 Process: (parent and child processes)
 - 5.8 Files and Directories (File Structure and directory structure)
 - 5.9 Interaction with System.
- Unit 6: Shells and Utilities (07L)**
- 6.1 Getting Started with Shell Programming
 - 6.2 The Bash Shell
 - 6.2.1 Shell Commands
 - 6.2.2 The role of Shells in the Linux Environment
 - 6.2.3 Other Standard Shells
 - 6.2.4 Write a Simple Shell Script - "Hello World!"
 - 6.2.5 Variables in Shell
 - 6.2.6 Bash Variable Existence Check
 - 6.3 Customize the Bash Shell Environments:
 - 6.3.1 Recalling Command History
 - 6.3.2 Path Name Expansion
 - 6.3.3 Create and Use Aliases
 - 6.3.4 The Tilde Expansion
 - 6.3.5 Startup Scripts
 - 6.3.6 Commonly Used Commands and Utilities.
- Unit 7: Basic Administration of Linux (07L)**
- 7.1 Basic System Administration (Run Levels, User Accounts)
 - 7.2 Kernel Administration: (Linux Kernel Sources, Rebuilding Kernel, Installing Kernel)
 - 7.3 Managing Users
 - 7.4 Managing File Systems
 - 7.5 Linux File Permissions
 - 7.6 Devices and Modules (Device Drivers).

Reference Books:

1. Operating System Concepts, 9th Edition, John Wiley & Sons, Inc. by Silberschatz, Peter Baer Galvin, GregGagne,
2. Linux Administration, A Beginner's, Guide by Wale Soyinka, Tata McGraw-Hill
3. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012.
4. Operating Systems: Internals and Design Principles, 8th edition Pearson Education Limited, 2014 by William Stallings.
5. Modern Operating system by Andrew Tanenbaum.
6. Distributed Operating System by Andrew Tanenbaum
7. Linux Shell Scripting By Ganesh Naik

Class: SYBBA (C.A) (Sem III)

Subject: BBA (C.A)

Course: Operating System

Course Code: BCA2304

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2	3	2						
CO2	3	2	2	2	2						
CO3	3	3	3	3	2						
CO4	2	2	3	2	3						
CO5		2									
CO6	1	1									

PO1. Knowledge:

CO1, CO2, CO3, CO4, and CO6 Slightly mapped as students gain the knowledge on concepts of secondary storage structure and protection.

PO2. Problem Analysis:

CO1, CO2, CO3, CO4, CO5, CO6 Moderately mapped problem analysis is necessary to find solutions for disk scheduling and problems with the Linux operating system. Knowledge about system calls helps to find the solution of complex problems related to OS.

PO3. Design and Development:

CO1, CO2, CO3, CO4 Moderately mapped as the knowledge about the significance of OS in computing devices helps to design and develop new computing devices with new OS.

PO4. Conduct investigations of complex problems:

CO1, CO2, CO3, and CO4 are moderately or strongly mapped as the disk scheduling algorithms, which helps to choose the suitable algorithm when designing a new OS so as to solve complex problems.

PO5. Modern Tool Usage:

CO1, CO2, CO3, CO4 Moderately mapped as student use various different types of Operating System like Linux, Windows operating system.

Class : S.Y.BBA (C.A.) (Semester – III)

Paper Code : BCA2305

Title of Paper: Business Statistics using R Programming

Credit: 3

No. of. Lectures: 48

A] Course Objectives

1. To understand role and importance of statistics in various business situation.
2. To develop skills related with basic statistical technique.
3. Develop right understanding regarding regression, correlation and data interpretation.
4. Understand how to link data, statistical methods using R Programming.
5. To apply Measure of central tendency and dispersion to grouped and ungrouped data.
6. To understand difference between various sampling techniques.
7. To learn basic syntax, coding to aid in data analysis.

B] Course Outcomes:

Student should be able to

CO1. Develop proficiency in using statistical tools and software..

CO2. Apply mathematical and statistical techniques to analyze and interpret data.

CO3. Apply knowledge of mathematics and statistics to solve real-world problems.

CO4. Demonstrate programming skills and the ability to use appropriate tools for statistical analysis.

CO5. Communicate effectively using graphical and numerical representations.

CO6. Apply statistical principles and methods to design experiments and analyze data.

CO7. Understand and apply probability concepts in statistical analysis.

	Topics/Contents	
Unit 1:	Introduction to Statistics	(08L)
	1.1 Introduction to Statistics	
	1.2 Importance of Statistics in Modern Business Environment.	
	1.3 Need of Data	
	1.4 Types of Data	
	1.5 Principles of Measurement	
	1.6 Source of Data	
	1.7 Data Classification	
	Graphical Methods	
	1.8 Raw Data	
	1.9 Attributes , Variables and Classification	
	1.10 Frequency Distribution	
	1.11 Cumulative Frequency Distributions	
	1.12 Graphs -Histogram, Frequency Polygon.	
	1.13 Diagrams - Multiple Bar, Pie, Subdivided Bar.	
Unit 2:	Measures of Central Tendency and Dispersion	(08L)
	2.1 Criteria for Good Measures of Central Tendency.	
	2.2 Arithmetic Mean, Median and Mode for Grouped and Ungrouped Data, Combined Mean.	
	Measures of Dispersion :	
	2.3 Concept of Dispersion	

	2.4 Absolute and Relative Measure of Dispersion	
	2.5 Range, Variance	
	2.6 Standard Deviation	
	2.7 Coefficient of Variation	
	2.8 Quartile Deviation	
	2.9 Coefficient of Quartile Deviation.	
Unit 3:	Probability and Probability Distribution	(08L)
	3.1 Basics of Probability	
	3.2 Counting Principles-Permutation and combination	
	3.3 Random Variable	
	3.4 Expected Values and Variance Probability Distribution	
	3.5 Bernoulli –Probability Function, Mean and Variance	
	3.6 Binomial- Probability Distribution, Cumulative Probability Distribution, Mean and Variance.	
Unit 4:	Sampling and Sampling Statistics	(06L)
	4.1 Sampling Strategies	
	4.2 Distribution of Sampling Strategies	
	4.3 Mean, Variance ,Proposition	
	4.4 Central Limit Theorem	
Unit 5:	Simple Correlation and Regression	(08L)
	5.1 Concept of Correlation	
	5.2 Positive & Negative Correlation	
	5.3 Karl Pearson’s Coefficient of Correlation	
	5.4 Meaning of Regression	
	5.5 Two Regression Equations	
	5.6 Regression Coefficients and Properties.	
Unit 6:	Basics of R programming	(10L)
	6.1 Introduction, Basic Features of R, Data Types an Data Structures in R, Variables, Operators	
	6.2 R Commands and Functions	
	6.3 Creating a Vector using C, Scan Function	
	6.4 Data Frame –Creating, Accessing and MerginData Frame	
	6.5 Importing Data from File	
	6.6 Using Read Table Command	
	6.7 Saving the R-output in a File	
	6.8 Concept of R-script File	
	6.9 Graphics using R :	
	a) High Level Plotting Functions	
	b) Low Level Plotting Functions	
	c) Interactive Graphic Functions	
	Programming in R	
	6.10 Statements: if and if...else, for loop	
	6.11 Cat and Print Commands.	

Extra Reading:

Hypothesis, scaling, measurement, analysis, testing

Reference Books:

1. Business Statistics, J. K. Sharma, Pearson Education-2nd Edition
2. Business Statistics, Naval Bajpai, Pearson Education-2nd Edition
3. Complete Business Statistics, Amir Aczel, Jayavel Sounderpandian, (Seventh Edition)
4. Statistics - An introduction using R. John Wiley, London, Crawley, M. J. (2006).
5. Statistics using R, second edition. Narosa Publishing House, New Delhi, Purohit, S.G.;Gore, S.D. and Deshmukh, S.R.

Class: SYBBA (C.A) (Sem III)

Subject: BBA (C.A)

Course: Business Statistics using R Programming

Course Code: BCA2305

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1			3		3						
CO2	3	3	3		3						3
CO3	3	3	3								
CO4				3	3						
CO5			3		3					3	
CO6	3	3	3	2							3
CO7	3	3		2							

PO1. Knowledge:

CO2 CO3 CO6 CO7 are strongly mapped as students gain knowledge on concepts of analyzing and interpreting data, statistical principles, and methods.

PO2. Problem Analysis:

CO2 CO3 CO6 is strongly mapped as students can solve mathematics and statistics real-world problems.

PO3. Design and Development:

CO1 CO2 CO3 CO5 CO6 is Strongly Mapped to Design experiments and analyze data using R. Develop skills in producing graphical and numerical representations. Apply knowledge of mathematics and statistics to solve real-world problems.

PO4. Conduct investigations of complex problems:

CO4 CO6 CO7 moderately Demonstrate programming skills and the ability to use appropriate tools for statistical analysis. Apply statistical principles and methods to design experiments and analyze data. Understand and apply probability concepts in statistical analysis.

PO5. Modern Tool Usage:

CO1 CO2 CO4 CO5 are strongly mapped as student's able to various software for design experiments and analyze data. Communicate effectively using graphical and numerical representations.

PO10. Communication:

CO5 is strongly mapped as Communicate effectively using graphical and numerical representations.

PO11. Innovation, employability, and Entrepreneurial skills:

CO2 CO6 is strongly mapped as various techniques to analyze and interpret data.

SYLLABUS (CBCS) FOR S.Y.BBA (C.A.) (w. e. from June, 2020)

Academic Year 2020-2021

Class : S.Y.BBA (C.A.) (Semester - III)

Paper Code: BCA2306

Title of Paper: Computer Laboratory (Based on BCA2301 & UBCA2302)

Credits: 02

No of Lectures: 48

Course Objectives –

1. To study basic concepts of Java
2. To understand how to develop applications using Applet, Swing, AWT
3. To learn HTML and CSS tags and JavaScript Language programming concepts and techniques.
4. To create both simple and complex HTML and CSS forms.
5. To introduce the implementation of packages and interfaces
6. Get to know About HTML5, CSS3, JavaScript and jQuery.
7. To impart the design, development and implementation of Dynamic Web Pages.

Course Outcomes-

Students should be able to

CO1: Develop proficiency in programming languages and tools.

CO2: Apply JDBC techniques to analyze and interpret data.

CO3: Apply knowledge of Servlet Programming and JSP to solve real-world problems.

CO4: Demonstrate programming skills and the ability to use appropriate tools for Software development.

CO5: Communicate effectively using appropriate tools and technologies.

CO6: Apply Web Services and Programming Interfaces and methods to design experiments and analyze data.

CO7: Understand and apply ethical principles in data management and software development.

Topics/Content

Java Programming Assignments

- Assignment on Basic Programs of Java
- Assignment on Classes and Objects in Java
- Assignment on Constructor and destructor
- Assignment on Inheritance
- Assignment on Interfaces
- Assignment on Packages
- Assignment on Collection – Linked List , Set, Vector, Array List
- Assignment on File Handling in Java
- Assignment on Exception Handling in Java
- Assignment on Applet
- Assignment on AWT
- Assignment on Swing

Web Technologies Assignments

- Assignment on Basic HTML tags
- Assignment on creating list, tables through HTML
- Assignment on External linking, internal linking and image with link.
- Assignment on Forms in html
- Assignment on Styling HTML with CSS
- Assignment on JavaScript
- Assignment on JavaScript validation.
- Assignment on jQuery

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3		3		3						
CO2		3			3						
CO3	3		3	3							
CO4				3	3						3
CO5					3						
CO6		3	3			3					3
CO7	3	3	3								3

PO1. Knowledge:

CO1 CO3 CO7 are strongly mapped as students able to gain knowledge of programming languages and tools and solve real-world problems.

PO2. Problem Analysis:

CO2 CO6 CO7 are strongly mapped as students able to JDBC techniques to analyze and interpret data and apply ethical principles in data management and software development

PO3. Design and Development:

CO1 CO3 CO6 CO7 are strongly mapped as students able to design and develop Programming Interfaces and software development.

PO4. Conduct investigations of complex problems:

CO3 CO4 is strongly mapped as students able to solve real-world problems. Programming Interfaces and methods to design experiments and analyze data.

PO5. Modern Tool Usage:

CO1 CO2 CO4 CO5 are strongly mapped as students can use various tools and techniques for software development or create Programming Interfaces.

PO6. Ethics and Social Responsibility:

CO6 is strongly mapped with Web Services Programming Interfaces and methods to design experiments and analyze data.

PO11. Innovation, employability, and Entrepreneurial skills:

CO 4 CO6 CO7 is strongly mapped as a student will able to develop software and their programming skills.

**SYLLABUS (CBCS) FOR S.Y.BBA (C.A.) (w. e. from June, 2020)
Academic Year 2020-2021**

Class : S.Y.BBA (C.A.) (Semester III)

Paper Code: BCA2307

Title of Paper: Computer Laboratory (Based on BCA2303 & BCA2305)

Credits: 02

No of Lectures: 48

Course Objectives –

1. To study basic concepts of Python
2. To develop and understand how to create modules in Python
3. To understand working of String, List, Tuple, Dictionary, Set for Python Programming.
4. To develop and understand Data Visualization using R-Programming.
5. To understand programming with Vector, List, Matrix, Dataframe, Factors using R-Programming.
6. To do input/output with files in Python.
7. How to implement data structure in R

Course Outcomes-

Students should be able to

CO1. Identify Appropriate Data Types, Control Statements.

CO2. Demonstrate programming skills using String, List, Tuple, Dictionary, Set for Python Programming.

CO3. Write programs using Modules in Python Programming.

CO4. Get familiar with R-Software and Learn basics of R-Programming

CO5. Understand the Basics in R-Programming in terms of control statements, String Functions

CO6. Communicate effectively using appropriate tools and technologies.

CO7. Design experiments using Visualization and analyze data.

Topics/Content

Python Programming Assignments

- Assignment on Operator and Evaluation of Expression
- Assignment on Decision Making Statements
- Assignment on Looping Statements (for, while ,Nested Loop)
- Assignment on User defined functions
- Assignment on String, List & Tuple
- Assignment on Dictionary & Set
- Assignment on File Handling (Reading & Writing Files)
- Assignment on Modules
- Assignment on Exception Handling
- Assignment on OOPs concept in Python

R - Programming Assignments

- Assignment on Operator and Evaluation of Expression
- Assignment on Decision Making Statements
- Assignment on Functions (Built in & User Defined)
- Assignment on Mean, Mode Median
- Assignment on Looping Statements
- Assignment on Vector
- Assignment on List
- Assignment on Matrix
- Assignment on Data Frame
- Assignment on Factor
- Assignment on Data Visualization in R-Programming
- Assignment on File Handling in R-Programming

Class: SYBBA (C.A) (Sem III)

Subject: BBA (C.A)

Course: Computer Laboratory based on(BCA2303, BCA2305) **Course Code:** BCA2307

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3							3		
CO2				3					3		
CO3			3						3		
CO4	3				3				3		
CO5	3								3		
CO6			3		3				3	3	3
CO7		3	3						3		3

PO1. Knowledge:

CO1, CO4, and CO5 are strongly mapped as students gain knowledge about the basics of Python and R programming.

PO2. Problem Analysis:

CO1 CO7 is strongly mapped, as students can visualize and analyze the data.

PO3. Design and Development:

CO3, CO6, and CO7 are strongly mapped, as students can design and develop design experiments using visualization and analysis data.

PO4. Conduct investigations of complex problems:

CO2 is strongly mapped as a student able to demonstrate programming skills using strings, lists, tuples, dictionaries, and sets for Python programming.

PO5. Modern Tool Usage:

CO4 and CO6 are strongly mapped as students get familiar with R and Python software.

PO9. Project Management:

All COs contribute to the development of project development and management skills using all Python tools and technology.

PO10. Communication:

CO6 is strongly defined as students being able to communicate effectively using appropriate tools and technologies.

PO11. Innovation, employability, and entrepreneurial skills:

CO6 and CO7 are strongly mapped as students who are able to develop software and acquire programming skills.