

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.

SYLLABUS STRUCTURE OF

Bachelor of Business Administration (Computer Application)

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

S.Y.BBA(CA)

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

Semester–IV (w. e. f. A.Y. 2020-2021)

Subject Code	Name of Subject	Marks			Credit
		Int.	Ext.	Total	
BCA2401	Advanced Java Programming	40	60	100	03
BCA2402	Advanced Web Technologies	40	60	100	03
BCA2403	Mathematical Foundation for Data Science	40	60	100	03
BCA2404	Software Testing and Quality Assurance	40	60	100	03
BCA2405	Networking	40	60	100	03
BCA2406	Computer Laboratory based on (BCA2401 and BCA2402)	40	60	100	02
BCA2407	Computer Laboratory based on (BCA2404 and BCA2405)	40	60	100	02
Project		-	-	-	04
Total		280	420	700	23

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] Learning Objectives:

1. To learn the syntax and program structures in Java Programming.
2. To understand concepts of object-oriented programming in Java.
3. To learn Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
4. To understand how to use programming in day-to-day applications.

B] Learning Outcomes:

Student should be able to

1. Know the different basic concepts of Java programming language.
2. Use the Java programming language for various programming technologies
3. 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

Unit 3: Collection (10L)

- 3.1 Collection Framework.
 - 3.1.1 Interfaces
 - Collection
 - List
 - Set
 - SortedSet
 - Enumeration
 - Iterator
 - ListIterator
 - 3.1.2. Classes
 - LinkedList
 - ArrayList
 - Vector
 - HashSet
 - TreeSet
 - Hashtable
- 3.2 Working with Maps
 - 3.2.1 Map Interface
 - 3.2.2 Map Classes
 - HashMap
 - TreeMap

Unit 4: File and Exception Handling (10L)

- Exception**
 - 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 Component and Container Classes

Reference Books:

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

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] Learning Objectives:

1. To impart the design, development and implementation of Dynamic Web Pages.
2. To develop programs for Web using Scripting Languages.
3. To Design and implement dynamic websites with good sense of designing and latest technical aspects.

B] Learning Outcome:

Student should be able to design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.

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 Response Message

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

- 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 Swedberg
9. HTML5 & CSS3 , Castro Elizabeth 7th Edition

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] Learning Objectives:

1. To develop problem solving skills and their implementation through Python
2. To understand and implement concept of object-oriented methodology using Python.

B] Learning Outcomes:

Student should be able to

1. Design and program Python applications.
2. Use lists, tuples, and dictionaries in Python programs.
3. Use indexing and slicing to access data in Python programs.
4. Read and write files in Python.

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, swapcase
- 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

- 2.5 Built-In Function, Invoking Built- In Functions
- 2.6 Module (Importing entire module or selected objects using from statement)
- 2.7 Functions from Math, Random, Time & Date Module.
- 2.8 Composition
- 2.9 User Defined Function: Defining, Invoking Functions, Passing Parameters (*default parameter values, keyword arguments*)
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

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] Learning 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 gain knowledge on distributed operating system concepts.
5. To learn about Basics of Linux.
6. To learn programmatically to implement Linux OS mechanisms
7. To know about Basic Administration of Linux

B] Learning Outcomes:

Student should be able to

1. Learn the fundamentals of Operating Systems.
2. Know the functionality of Multiprocessor OS and Mobile OS.
3. Develop knowledge on distributed operating system concepts.
4. Learn Basic Administration of Linux.

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 McGrawHill
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 Tenenbaum.
6. Distributed Operating System by Andrew Tanenbaum
7. Linux Shell Scripting By Ganesh Naik
8. Linux Bible By Christopher Negus
9. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010.

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 : BCA2305

Title of Paper: **Business Statistics using R Programming**

Credit: 3

No. of. Lectures: 48

A] Learning 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.

B] Learning Outcomes:

Student should be able to

1. Get familiar with R software and learn basics of R with descriptive statistics.
2. Compute probabilities and fitting of probability distribution with R environment.
3. Appreciate and apply the R programming from a statistical perspective.
4. Understand the basics in R programming in terms of constructs, control statements, string functions.

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 and 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 Merging Data 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. (2015).

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

Academic Year 2020-2021

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

Paper Code : BCA2401

Title of Paper: **Advanced Java**

Credit: 3

No. of. Lectures: 48

A] Learning Objectives:

1. To learn the advanced concepts of Java Programming.
2. To learn to design game-based applications using Graphics, Animations, and Multithreading.
3. To learn to design and develop web applications.
4. To understand how to use programming in day-to-day applications.
5. To understand network programming.
6. To understand and develop and deploy web services.

B] Learning Outcomes:

A student should be able to

1. Learn to access database using Java Data Base Connectivity in Java programs.
2. Learn to use an Applet for internet programming.
3. Develop dynamic webpages using Servlets and JSP.
4. Develop client/server applications and TCP/IP socket programming
5. Develop and deploy web services using Java.

Topics/Contents

Unit 1: JDBC

(08L)

- 1.1 The Design of JDBC
- 1.2 Basic JDBC Program Concept
- 1.3 Drivers
- 1.4 Architecture of JDBC
- 1.5 Making the Connection, Statement, ResultSet, Prepared Statement, Callable Statement
- 1.6 Executing SQL Commands
- 1.7 Executing Queries

Unit 2: Multithreading

(08L)

- 2.1 Threading Basics
- 2.2 Life Cycle of a Thread
- 2.3 Creating Threads
- 2.4 Priorities and Synchronization
- 2.5 Inter Thread Communication
- 2.6 Runnable Interface

Unit 3: Servlet	(06L)
3.1 Introduction	
3.2 How It Differs from CGI	
3.3 Types of Servlets	
3.4 The Life Cycle of a Servlet	
3.5 Execution Process of Servlet Application	
3.6 Session Tracking	
3.7 Cookie Class	
3.8 Servlet- JDBC	
Unit 4: JSP	(05L)
4.1 Introduction to JSP	
4.2 Components of JSP Directives, Tags, Scripting Elements	
4.3 Execution process of JSP Application	
4.4 Building a simple application using JSP	
4.5 JSP with Database	
Unit 5: Networking	(05L)
5.1 The java.net package	
5.2 Connection-Oriented Transmission – Stream Socket Class	
5.3 Creating a Socket to a Remote Host on a Port (Creating TCP Client and Server)	
5.4 Simple Socket Program Example	
Unit 6: Java Beans and RMI Java Beans	(08L)
6.1 What is Bean?	
6.2 Advantages	
6.3 Using Bean Development Kit(BDK)	
6.4 Introduction to Jar and Manifest Files	
6.5 The java beans API	
Remote Method Invocation	
6.6 Introduction to Remote Object RMI architecture	
6.7 Stubs and Skeleton	
6.8 Registry	
6.9 Setting up RMI	
6.10 Using RMI with Applet	
Unit 7: Web Services	(08L)
7.1 Introduction to Web Services	
7.2 Types of Web Services	
7.3 REST	
What is REST?	
REST Oriented Architecture, Building Web Services, Publishing Web Services	

Extra reading:

1. Introduction to Hibernate
2. Advantages of Hibernate compared to JDBC
3. ORM (Object Relational Mapping)
4. Configuration xml file and Mapping xml file along with dtDs.
5. Hibernate architecture
6. Installation and Directory Structure
7. Hibernate Data Types.
8. First Application using Hibernate.

Reference Books :

1. The Complete Reference – JAVA Herbert Schildt
2. Core java –II By Cay S. Horstmann and Gary Cornell
3. Complete Reference J2EE – Jim Keogh

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

Academic Year 2020-2021

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

Paper Code : BCA2402

Title of Paper: **Advanced Web Technologies**

Credit: 3

No. of. Lectures: 48

A] Learning Objectives:

1. To know & understand concepts of internet programming.
2. To understand the concepts of XML and AJAX.

B] Learning Outcomes:

1. Students will be able to write a well formed/valid XML document.
2. Students will be able to connect program to a DBMS and perform insert, update and delete operations on DBMS table.

Topics/Contents

Unit 1: Introduction to PHP (08L)

- 1.1 Installation of XAMP/LAMP
- 1.2 What does PHP do?
- 1.3 Lexical Structure
- 1.4 Language Basics
 - 1.4.1 Data Types ,Variable, Constant, Keywords,
 - 1.4.2 Control Structures
 - 1.4.3 Type Casting, Type Juggling
- 1.5 \$_GET, \$_POST,\$_REQUEST Variables
- 1.6 Defining and Calling a Function
- 1.7 Default Parameters, Variable Parameters, Missing Parameters
- 1.8 Variable Function, Anonymous Function
- 1.9 Types of Strings in PHP
- 1.10 Encoding and Escaping
- 1.11 Manipulating and Searching Strings
- 1.12 **Arrays**
 - 1.12.1 Indexed Vs. Associative Arrays
 - 1.12.2 Identifying Elements of an Array
 - 1.12.3 Traversing Arrays
 - 1.12.4 Sorting

Unit 2: Web Techniques	(06L)
2.1 Web Variables	
2.2 Server Information	
2.3 Self-Processing Forms	
2.4 Setting Response Headers	
2.5 Maintaining State (Cookies and Sessions)	
Unit 3: Databases	(08L)
3.1 Using PHP to Access a Databases	
3.2 MySQL Database Functions	
3.3 Relational Databases and SQL	
3.4 PEAR DB Basics	
3.5 Advanced Database Techniques	
3.6 Sample Application	
Unit 4: XML	(08L)
4.1 What is XML?	
4.2 XML Document Structure	
4.3 PHP and XML	
4.4 XML Parser	
4.5 The Document Object Model	
4.6 The simple XML Extension	
4.7 Changing a Value with Simple XML	
Unit 5: Web Services	(06L)
5.1 Web Services Concepts	
5.2 WSDL, UDDI	
5.3 Introduction to SOAP XML-RPC	
5.4 Creating Web Services	
5.5 Calling Web Services	
Unit 6: Ajax	(06L)
6.1 Understanding Java Scripts for AJAX	
6.2 AJAX Web Application Model	
6.3 AJAX –PHP Framework	
6.4 Performing AJAX Validation	
6.5 Handling XML Data using PHP and AJAX	
6.6 Connecting Database using PHP and AJAX	
Unit 7: WordPress	(06L)
7.1 Installing WordPress	
7.1.1 Uploading WordPress to your Web Server	
7.1.2 Installing WordPress	
7.1.3 Database Connectivity	
7.1.4 Theme Customization	
7.2 Configuring WordPress	
7.2.1 Using the WordPress Dashboard	
7.2.2 Managing Content in the WordPress Dashboard	
7.2.3 Types of Users	

- 7.2.4 The WordPress Settings Panel
- 7.2.5 Reading and Writing Settings
- 7.2.6 Permalinks and RSS Feeds
- 7.2.7 Creating and Managing Posts
- 7.2.8 Setting up Post Categories
- 7.2.9 Creating and Managing Pages
- 7.2.10 Managing Comments
- 7.2.11 Installing and Updating Plugins
- 7.2.12 Customizing WordPress Themes
- 7.2.13 WordPress Theme Options

Extra Reading:

Angular 8

- 1.1 Angular 8 Installation
- 1.2 Create an app
- 1.3 Angular 8 Architecture, Components,
- 1.4 Directives-ngIf Directive, *ngFor Directive, ngSwitch Directive
- 1.5 Data Binding in Angular 8
- 1.6 Property Binding in Angular 8
- 1.7 String Interpolation
- 1.8 Event Binding
- 1.9 Two way Data Binding
- 1.10 Angular 8 Forms

Reference Books:

- 1. Programming PHP - Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
- 2. Beginning PHP 5 - Wrox publication
- 3. PHP web services - Wrox publication
- 4. WordPress 5 Complete Seventh Edition – Karol Krol
- 5. <https://www.javatpoint.com/angular-8>
- 6. Angular JS Tutorial - tutorialspoint.com by K. K. Panigrahi

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

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

Paper Code : BCA2403

Title of Paper: **Mathematical Foundation of Data Science**

Credit: 3

No. of. Lectures: 48

A] Learning Objectives:

1. To learn the basic functions and summation.
2. To understand concepts of Determinants and Matrices.
3. To learn Limits and Continuity, Differentiation and Integration.
4. To understand how to solve simultaneous equations using determinants and Matrix Theory.

B] Learning Outcomes:

Student should be able to

1. Understand how to use limits to compute the derivatives of a function.
2. Utilize methods of Integration.
3. Utilize applications of matrices to solve industrial problem.

Topics/Contents

Unit 1: Fundamentals (12L)

- 1.1 Approximation
- 1.2 Functions
- 1.3 Summation
- 1.4 Series Approximation
- 1.5 Induction

Unit 2: Linear Algebra (12L)

- 2.1 Vectors and Matrices
- 2.2 Scalar & Tensor
- 2.3 Addition & Multiplication of Matrices
- 2.4 Norms
- 2.5 Linear Independence
- 2.6 Special Kinds of Matrices – Diagonal, Symmetric, Orthogonal
- 2.7 Identity Matrices
- 2.8 Inverse of Matrices
- 2.9 Determinant

Unit 3: Calculus (12L)
3.1 Differentiation
3.2 Integration
3.3 Functions of Several Variables
3.4 Series Approximations

Unit 4: Gradient Descent (12L)
4.1 Functions
4.2 Gradients
4.3 Gradient Descent - Learning Rate
4.4 Fitting a Model to Data
- Least Mean Squares Updates for Regression
- Decomposable Functions

Reference Books:

- 1) Mathematical Foundations of Data analysis – Jeft. M. Phillips
- 2) Calculus and Linear Algebra - Book by Donald John Lewis and Wilfred Kaplan
- 3) Vector Calculus, Linear Algebra, and Differential Forms- John H. Hubbard, Barbara Hubbard

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

Academic Year 2020-2021

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

Paper Code : BCA2404

Title of Paper: **Software Testing & Quality Assurance**

Credit: 3

No. of. Lectures: 48

A] Learning Objectives:

1. To know the concept of software testing.
2. To understand how to test bugs in software.
3. To understand the basic of quality software and quality factors.

B] Learning Outcomes:

Student should be able to

1. Design Test Cases.
2. Check the software is built as per the requirement.
3. Check the Quality of the software.

Topics/Contents

Unit 1:	Software Testing	(06L)
	1.1 Introduction	
	1.2 Nature of Errors	
	1.3 Testing Principles & Testing Fundamentals	
	1.4 Debugging	
Unit 2:	Approaches to Testing – I	(10L)
	2.1 White Box Testing	
	2.2 Black Box Testing	
	2.3 Gray Box Testing	
	2.4 Unit Testing	
	2.5 Integration- Top-down ,Bottom Up, Big Bang ,Sandwich	
Unit 3:	Testing for Specialized Environments	(08L)
	3.1 Testing GUI's	
	3.2 Testing of Client/Server Architectures,	
	3.3 Testing Documentation and Help Facilities	
	3.4 Testing for Real- Time Systems	

- Unit 4: Software Testing Strategies (08L)**
- 4.1 Validation Testing
 - 4.2 System Testing
 - 4.3 Verification
 - 4.4 Performance Testing
 - 4.5 Regression Testing
 - 4.6 Agile Testing
 - 4.7 Acceptance Testing
 - 4.8 Smoke Testing
 - 4.9 Load Testing
- Unit 5: Specialized Testing & Automated Testing Tools (Introduction) (06L)**
- 5.1 Test Case Design,
 - 5.2 Junit
 - 5.3 Apache Jmeter
 - 5.4 Winrunner
 - 5.5 Loadrunner
 - 5.6 Rational Robot
 - 5.7 Ranorex
 - 5.8 Headpin,
 - 5.9 Sqish
 - 5.10 QTP
- Unit 6: Software Quality Assurance Fundamentals (10L)**
- 6.1 Definition of Quality, QA, QC, SQA
 - 6.2 SQA Planning & Standards
 - 6.3 SQA Activities
 - 6.4 Building Blocks of SQA
 - 6.5 Quality Factors,
 - 6.6 Software Quality Assurance Metrics –
 - 6.6.1 Measurement Software Quality Metrics
 - 6.6.2 Product Quality Metrics
 - 6.6.3 In-Process Quality Metrics
 - 6.6.4 Metrics for Software Maintenance

Reference Books:

1. Software Engineering – A Practitioners Approach, Roger S. Pressman, Tata McGraw Hill
2. Software Engineering for Students- A Programming Approach, Douglas Bell, Pearson Education
3. Software Quality Assurance by Daniel Galin, Pearson Publication, 2009
4. www.opensourcetesting.org

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

Academic Year 2020-2021

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

Paper Code : BCA2405

Title of Paper: **Networking**

Credit: 3

No. of. Lectures: 48

A] Learning Objectives:

1. To understand various computer networks and technologies behind networks
2. To study TCP/IP suite.
3. To study routing concept along with Routing protocols
4. To be familiar with wireless networking concepts and protocols

B] Learning Outcomes:

Student should be able to

1. Understand various computer networks and technologies behind networks
2. Learn TCP/IP suite
3. Learn routing concept along with Routing protocols
4. Get knowledge of wireless networking concepts and protocols

Topics/Contents

Unit 1: Introduction to Data Communication and Computer Networks (06L)

1.1 Overview of Basic Concepts and Components. Data Communication Characteristic, Data Representation, Data Flow, Network Criteria, Physical Structures and Topologies, Network Types- LAN, MAN, WAN

1.2 Internet

- 1.2.1 Concept of Intranet & Extranet
- 1.2.2 Internet Information Server (IIS)
- 1.2.3 World Wide Web(WWW)
- 1.2.4 Search Engine
- 1.2.5 Internet Service Providers (ISP)

1.3 Various types of Networks (only overview)

- 1.3.1 Connection Oriented N/W's Vs. Connectionless N/W's
- 1.3.2 Ethernet

1.3.3 Wireless LAN

1.3.4 X.25

1.3.5 ATM

Unit 2: Principles of Layering Concept (10L)

2.1 Need for Layering

2.2 ISO-OSI 7 Layer Model

2.3 TCP/IP Model

2.4 Comparison of ISO-OSI&TCP/IP Model

2.5 **Physical communication:**

2.5.1 Hardware Architecture

2.5.2 Transmission Media (Guided and Unguided i.e. Twisted Pair, Coaxial Cable, Fiber Optics, Wireless Transmission etc.)

2.5.3 Communication Devices (Switch, Router etc.)

2.5.4 Switching and its Types (Circuit Switching, Message Switching, Packet Switching)

Unit 3: Link Layer Communication (08L)

3.1 Error Detection and Correction Techniques

3.2 Framing and its Types

3.3 Flow and Error Control

3.4 HDLC Protocol

3.5 P2P Protocol

Note: Examples based on 3.1 to be covered

Unit 4: IP Addressing & Routing (08L)

4.1 Internet Protocol and IPv4 Packet Format

4.2 Addressing, Physical Addresses, Logical

Addresses Port Addresses, Specific Addresses

4.3 IP Address- Network Part and Host Part

4.4 Network Masks, Network Addresses and, Broadcast Addresses, Loop Back Address

4.5 Address Classes

4.6 TCP and UDP Connections

4.7 Overview of IPv6

Notes: Examples based on IP addressing to be covered

Unit 5: Routing Protocol (04L)

5.1 IP Routing Concept,

5.2 Routing Tables

5.3 Routing Protocols – RIP, IGRP, EIGRP, OSPF, BGP

Domain Name System (DNS)

5.4 Domain Namespace

5.5 DNS in the Internet

5.6 DNS Resolution and Caching

5.7 Resource Records, DNS Message

Unit 6: Network Applications (08L)

- 6.1 Hyper Text Transfer Protocol (HTTP),
HTTP Communications –HTTP Request,
Request, Headers, Responses, Status
Code, Error Status Code
- 6.2 Email- Sending & Receiving Email, Email
Addressing, Message Structure, SMTP – Simple
Mail Transfer Protocol, POP – Post Office
Protocol, IMAP- Internet Message Access
Protocol, FTP- File Transfer Protocol

Unit 7: Overview of Network Security (04L)

- 7.1 Active and Passive Attacks
- 7.2 Cryptography (Symmetric and Asymmetric)
- 7.3 Firewall

Reference Books:

1. Computer Networks Andrew S. Tanenbaum4e
2. Data Communication and Networking Behroz A. Forouzan, TMH, 4thEd
3. Cryptography and Network Security Atul Kahate, TMH 2ndEd.
4. Network Essential Notes GSW MCSE Study Notes
5. Internetworking Technology Handbook CISCO System
6. Computer Networks and Internets with Internet Applications Douglas Comer