Bhavan's Vivekananda College

of Science, Humanities and Commerce

Sainikpuri, Secunderabad

(Reaccredited with 'A' Grade by NAAC)

Autonomous College – Affiliated to Osmania University

Department of Computer Science

BCA V SEMESTER

CBCS (Choice Based Credit System) w.e.f. 2026-2027

Scheme of Instruction and Examination

Sl.No.	*Code*	*Paper Title*	*Course Type*	*PPW*		*Max. Marks*		*Max. Marks*		*Credits*
				TH	*PR*	*TH*	*TH-CIA*	*PR*	*PR-CIA*	
1	BCA541	Programming using ASP.NET	PCC	4		70	30			4
2	BCA542	Unix Programming	PCC	4		70	30			4
3	BCA543	Object Oriented System Development	PCC	4		70	30			4
4	BCA544	Software Quality Testing	PCC	4		70	30			4
5		**Elective-I**	PEC	4		70	30			4
	BCA545a	Mobile Computing								
	BCA545b	Internet of Things (IoT)								
	BCA545c	Data Mining								
	BCA545d	Distributed Database Systems								
6	BCA541P	DOTNET Lab	LCC		4			50	25	2
7	BCA542P	Unix Programming Lab	LCC		4			50	25	2
8	BCA543P	OOSD Lab	LCC		4			50	25	2
		Total		*20*	*12*	*350*	*150*	*150*	*75*	*26*

PCC: Professional Core Course **PEC: Professional Elective Course** **LCC: Laboratory Core Course**

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bhavan's Vivekananda College

of Science, Humanities and Commerce

Sainikpuri, Secunderabad

(Reaccredited with 'A' Grade by NAAC)

Autonomous College – Affiliated to Osmania University

Department of Computer Science

BCA VI SEMESTER

CBCS (Choice Based Credit System) w.e.f. 2026-2027

Scheme of Instruction and Examination

Sl.No.	*Code*	*Paper Title*	*Course Type*	*PPW*		*Max. Marks*		*Max. Marks*		*Credits*
				TH	*PR*	*TH*	*TH-CIA*	*PR*	*PR-CIA*	
1	BCA641	Information Security	PCC	4		70	30			4
2	BCA642	Advanced Java Programming	PCC	4		70	30			4
3		**Elective-II**	PEC	4		70	30			4
	BCA643a	Bigdata Analytics								
	BCA643b	Blockchain Technology								
	BCA643c	Machine Learning								
	BCA643d	Multimedia								
4	BCA642P	Advanced Java Programming Lab	LCC		4			50	25	2
5	BCA644	Project Work	PW		14			100	50	7
6	BCA645	Indian Constitution	VAC	1			25			0
		Total		*13*	*18*	*210*	*115*	*150*	*75*	*21*

PCC: Professional Core Course **PW: Project Work** **VAC: Value Added Course**
PEC: Professional Elective Course **LCC: Laboratory Core Course**

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bhavan's Vivekananda College

of Science, Humanities and Commerce

Sainikpuri, Secunderabad

(Reaccredited with 'A' Grade by NAAC)

Autonomous College – Affiliated to Osmania University

Department of Computer Science

BCA OVERALL 3 YEARS CREDITS (2024-25 to 2026-27)

CBCS (Choice Based Credit System

Sl.No.	*Course Type*	*No. of Papers*	*Credits*
1	*BSC*	3	12
2	*PCC*	21	84
3	*HSC*	1	04
4	*PEC*	2	08
5	*MC*	1	04
6	*LCC*	14	28
7	*LHC*	1	02
8	*Technical Seminar (SEC)*	1	02
9	*Project Work (PW)*	1	07
10	*MOOCs (NPTEL)*	1	02
11	*VAC*	1	0
	Total		153

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bhavan's Vivekananda College

of Science, Humanities and Commerce
Sainikpuri, Secunderabad
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

BCA OVERALL 3 YEARS CREDITS SEMESTER WISE (2024-25 to 2026-27)

CBCS (Choice Based Credit System)

Sl.No.	*Semester*	*Credits*
1	I	*26*
2	II	26
3	III	28
4	IV	26
4	V	26
5	VI	21
	Total	153

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

PROGRAM NAME: BCA
COURSE NAME: PROGRAMMING USING ASP.NET
(w.e.f. 2026-27)

PAPER CODE: BCA541 **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge in students to develop web-based applications.

UNIT-WISE COURSE OBJECTIVES:

COb1: To explain ASP.NET Framework and its Controls.

COb2: To paraphrase ASP.NET Validation Controls and Master Pages.

COb3: To design Websites using Themes and use ADO.NET.

COb4: To illustrate concepts of DataBound Controls and List Control.

COb5: To demonstrate GridView Control, DetailsView and FormView Control.

UNIT I

Overview of the ASP.NET Framework: ASP.NET and the .NET Framework, Understanding ASP.NET Controls, Understanding ASP.NET Pages.

Using the Standard Controls: Displaying Information – Using the Label Control. Accepting User Input – Using the TextBox Control, Checkbox Control, RadioButton Control. Submitting Form Data – Using Button Control, LinkButton Control, ImageButton Control, Using Client Scripts with Button Controls, Performing Cross-Page Posts, Specifying a Default Button, Handling the Command Event. Displaying Images – Using the Image Control, Using the ImageMap Control. Using the Panel Control, Using the Hyperlink Control.

(Book 1 - Chapters: 1, 2)

UNIT II

Using the Validation Controls: Overview of the Validation Controls, RequiredFieldValidator Control, RangeValidator Control, CompareValidator Control, RegularExpressionValidator Control, CustomValidator Control, ValidationSummary Control.

Designing Websites with Master Pages: Creating Master Pages – Creating Default Content, Nesting Master Pages, Using Images and Hyperlinks in Master Pages, Registering Master Pages in Web Configuration, Modifying Master Page Content – Using the Title Attribute, Page Header Property, Exposing Master Pages Properties, Using FindControl with Master Pages, Loading Master Pages Dynamically – Loading Master Pages Dynamically for Multiple Content Pages.

(Book 1 - Chapters: 4, 5)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT III

Designing Websites with Themes: Creating Themes, Adding Skins to Themes – Creating Named Skins, Themes versus StyleSheetThemes, Disabling Themes, Registering Themes in Web Configuration File. Adding Cascading Style Sheets to Themes – Adding Multiple Cascading Style Sheets to a Theme, Changing Page Layouts with Cascading Style Sheets. Creating Global Themes, Applying Themes Dynamically – Applying Skins Dynamically.

Building Data Access Components with ADO.NET: Connected Data Access – Using Connection Object, Command Object, DataReader Object. Disconnected Data Access – Using the DataAdapter Object, DataTable Object, DataView Object, DataSet Object.

(Book 1 - Chapters: 6, 17)

UNIT IV

Overview of Data Access: Using DataBound Controls – Working with List Controls, Working with Tabular DataBound Controls, Working with Hierarchial DataBound Controls, Working with Other Controls. Using DataSource Controls – Using ASP.NET Parameters with DataSource Controls.

Using List Controls: Overview of the List Controls – Declaring List Items, Binding to a Data Source, Determining the Selected List Item, Appending Data Items, Enabling Automatic PostBacks, Using the Items Collection.Working with the DropDownList Control, RadioButtonList Control, ListBox Control, CheckBoxList Control, BulletedList Control.

(Book 1 - Chapters: 8,10)

UNIT V

Using the GridView Control: GridView Control Fundamentals – Displaying Data, Selecting Data, Using Data Keys, Sorting Data, Paging Through Data, Editing Data, Displaying Empty Data, Formatting the GridView Control. Using Fields with the GridView Control – Using BoundFields, CheckBoxFields, CommandFields, ButtonFields, HyperLinkFields, ImageFields. Working with GridView Control Events – Highlighting GridView Rows, Displaying Column Summaries, Displaying Nested Master/Details Forms. Extending the GridView Control – Creating a LongTextField, DeleteButton Field, ValidatedField.

Using the DetailsView and FormView Controls: Using the DetailsView Control – Displaying Data, Using Fields, Displaying Empty Data, Paging Through Data, Updating Data, Inserting Data, Deleting Data, Working with DetailsView Control Events, Formatting the DetailsView Control. Using the FormView Control - Displaying Data, Paging Through Data, Editing Data, Inserting Data, Deleting Data.

(Book 1 - Chapters: 11, 12)

Suggested Readings:

1. Stephen Walther, ASP.NET 3.5 Unleashed, SAMS Publications, 2011.
2. Dino Esposito, Programming ASP.NET Core, Microsoft Press, 2019.
3. Mathew MacDonald, ASP.NET – The Complete Reference, MaGraw Hill Education, Indian Edition, 2017.
4. Imar Spaanjaars, Beginning ASP.NET 4.5.1 in C# and VB, Wiley, 2014.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA541 CO1: Develop applications using ASP.NET Controls.

BCA541 CO2: Write applications using ASP.NET Validation Controls and Master Pages.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

BCA541 CO3: Apply themes and ADO.NET concepts in developing applications.

BCA541 CO4: Program applications using DataBound Controls and List Control.

BCA541 CO5: Compile applications using GridView, DetailsView and FormView Control.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in ~~Informatics~~
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: DOTNET LAB
(w.e.f. 2026-27)

PAPER CODE: BCA541P **YEAR/SEMESTER: III/V**

COURSE OBJECTIVE: To impart knowledge in students on the execution process of client server applications.

UNIT-WISE COURSE OBJECTIVES:

CObl: To demonstrate Web Form Controls using ASP.NET.

CObl: To illustrate the usage of ADO.NET.

1. Installing .NET Framework.
2. Installing Visual Studio 2013.
3. Hello World in Visual Studio.
4. GUI form Design for student attendance.
5. GUI form to design Form Controls.
6. For Loop Execution for DropDownList.
7. While Loop Execution for Popup Menu.
8. ADO.NET connecting to DataSource.
9. ADO.NET connectivity for Accessing MSSQL Table to demonstrate select and create queries.
10. ADO.NET to insert and update data using Grid.
11. ASP.NET for student marks using HTML along with Form Controls.
12. ASP.NET displaying student details with ADO.NET and AJAX Controls

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA541P CO1: Develop applications using Web Form Controls using ASP.NET.

BCA541P CO2: Implement the concepts of ADO.NET.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

PROGRAM NAME: BCA
COURSE NAME: UNIX PROGRAMMING
(w.e.f. 2026-27)

PAPER CODE: BCA542 **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To enrich students with the knowledge of Unix Programming, Working and Processing of UNIX Environment.

UNIT-WISE COURSE OBJECTIVES:

Cob1: To examine the Unix System architecture and standardization of UNIX System with its effect on current systems

COb2: To describe the basic input and output functions provided by the UNIX system and all the attributes of UNIX files and directories.

COb3: To compare the standard I/O Library used by UNIX applications and environment of a C program.

COb4: To associate the various process control functions, Process Relationships and Signals in Unix.

COb5: To explore various features in terminals and methods of Inter Process Communication.

UNIT I

UNIX System Overview: Introduction; UNIX Architecture, logging in, Files and Directories- File System, Filename, Path name, Working Directory, Home Directory, Input and Output- File Descriptors, Standard Input, Standard Output, and Standard Error, Unbuffered I/O, Standard I/O, Programs and Processes- Program, Processes and Process ID, Process Control, Threads and Thread ID, Error Handling, Signals, System Calls and Library Functions. **(Book 1 - Chapter: 1)**

UNIT II

File IO- Introduction, File Descriptors, open and openat functions, creat function, close function, lseek function, read function and write function.

Files and Directories-Introduction, stat, fstat, fstatat and lstat functions, file types, Set-User-ID and SetGroup-ID, File Access Permissions, Ownership of New Files and Directories, access and faccessat function, umask function, chmod and chown function, File systems, link, unlink, remove and rename functions, mkdir, chdir and rmdir functions.

(Book 1 - Chapters: 3, 4)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT III

Standard IO Library- Introduction, Streams and FILE Objects, Standard Input, Standard Output and Standard Error, Opening a Stream, Reading and Writing a stream.

Process environment- Introduction, Overview of C Language, Main Function, Process Termination, Command-Line Arguments, Memory Allocation, Environment variables.

(Book 1 - Chapters: 5, 7)

UNIT IV

Process Control- Introduction, Process Identifiers, fork Function, exit function, wait and exec Functions, race conditions, changing user IDs and Group IDs, Process Accounting, User Identification

Process relationships -Terminal Logins, Network Logins.

Signals- Signal Concepts, Signal Function, Unreliable Signals.

(Book 1 - Chapters: 8, 9, 10)

UNIT V

Terminal I/O- STTY COMMAND, Baud Rate Functions, Line Control Functions, Canonical Mode, Noncanonical Mode.

Inter process Communication-Pipes, FIFOs, Message Queues, Semaphores, Shared Memory, and Client-Server Properties.

(Book 1 - Chapters: 18, 15)

Suggested Readings:

1. W. Richard Stevens- Advanced Programming in the UNIX environment, 3rd Edition, 2013.
2. Sumitabha Das, "Unix: Concepts and Applications", 4th Edition, 2017.
3. Advanced Unix, A Programmers Guide, Prata, Stephen BPB, 2008.
4. Unix: Complete Reference, Rosen, Kenneth Others TMH, 2nd Edition, 2007.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA542 CO1: Recall the architecture and standardization of the Unix System.

BCA542 CO2: Paraphrase the basic input and output functions provided by the UNIX system and attributes associated with its files and directories.

BCA542 CO3: Interpret the standard I/O library of Unix System and its environment in C programs.

BCA542 CO4: Analyze the Process control and Process Relationships.

BCA542 CO5: Summarize the features of Terminals and Inter Process Communication methods.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: UNIX PROGRAMMING LAB
(w.e.f. 2026-27)

PAPER CODE: BCA542P **YEAR/SEMESTER: III/V**

COURSE OBJECTIVE: To impart knowledge about UNIX system administration commands.

UNIT-WISE COURSE OBJECTIVES:

COb1: To implement the system administrative commands, system calls in Unix.

COb2: To program the implementation of system calls in Unix.

1. Creating users and groups (Execution of various system administration Commands such as useradd, usermod, password, groupmod, uname, permission(r,w,x)(4,2,1), umask, chmod and chown.
2. Write a shell script that takes a command line argument and reports on whether it is directory, a file or something else.
3. Program to search for a given pattern in a file.
4. Write a shells script that accepts one or more file names as arguments and converts all of them into Uppercase, provided they exist in the current directory.
5. Write a shells script to delete all the temporary files.
6. Write a program to create a child process using fork() and exec() system calls.
7. Write a program using open(), read() and write() system calls.
8. Implementation of Signals in UNIX.
9. Write a shells script to check and list attributes of a processes.
10. Write a shells script to display list of users currently logged in
11. Write a C program to illustrate the Race Condition.
12. Write a C Program which demonstrates inter process communication between a reader process and a writer process.
13. Write a C/C++ program for Inter process communication using pipes.

COURSE OUTCOMES:

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

BCA542P CO1: Implement the System administrative commands in Unix.

BCA542P CO2: Program the system calls in Unix.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: OBJECT ORIENTED SYSTEM DEVELOPMENT
(w.e.f. 2026-27)

PAPER CODE: BCA543 **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge in students about structural, behavioral, architectural modeling and unified software development process of Object-Oriented Systems.

UNIT-WISE COURSE OBJECTIVES:

COb1: To illustrate overview & architecture of UML and design the classes and relationships.

COb2: To demonstrate UML features of diagrams, advanced classes, advanced relationships, interfaces and packages.

COb3: To describe the object diagrams, use cases, use case diagrams, interaction diagrams, and activity diagrams.

COb4: To inculcate knowledge on events and signals, state machines, process and threads, time and spaces, state chart diagrams.

COb5: To illustrate components, deployment, collaborations, component diagrams and deployment diagrams.

UNIT I

UML Introduction: Why we Model- importance of modeling, principles of modeling, Object oriented modeling.
Introducing the UML-an overview of UML, A conceptual model of the UML, Architecture of the UML, Software Development Life Cycle.
Classes- Terms and Concepts, Modeling the vocabulary, Modeling the distribution of responsibilities, modeling non structure things, modeling primitive types of systems.
Relationships-Terms and Concepts, modeling single dependency, modeling single inheritance, modeling structural relationship.
(Book1-Chapters: 1, 2, 4, 5)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT II

Common Mechanisms- Terms and Concepts, modeling comments, modeling new building blocks, modeling new properties.

Diagrams- Terms and Concepts, modeling different views of a system.

Advanced Classes- Terms and Concepts.

Advanced Relationships- Terms and Concepts.

Interfaces, Types and Roles-introduction, names, operations, relationships, understanding an interface, types and roles.

Packages-introduction, names, owned elements, visibility, import and exporting, generalization, standard elements.

(Book1-Chapters: 6, 7, 9, 10, 11, 12)

UNIT III

Class and Object Diagrams- Terms and Concepts, Modeling object structures for Class Diagrams.

Interactions-terms and concepts, modeling a flow of control, Use **Cases-**terms and concepts, modeling a behavior of an element.

Use Case Diagrams-terms and concepts, modeling the context of a system, modeling the requirement of a system, forward and reverse engineering.

Interaction Diagrams-terms and concepts, modeling flows of control by time ordering, modeling flows of control by organization.

Activity Diagrams-terms and concepts, modeling a work flow, modeling an operation.

(Book1-Chapters: 14, 15, 16, 17, 18, 19)

UNIT IV

Events and Signals- Terms and Concepts, modeling a family of signals, modeling exceptions,

State Machines- Terms and Concepts, modeling the life time of an object.

Processes and Threads- Terms and Concepts, modeling multiple flows of control.

Times and Space- Terms and Concepts, modeling time constraints, modeling the distribution of objects.

State Chart Diagrams- Terms and Concepts, modeling reactive objects.

(Book1-Chapters: 20, 21, 22, 23, 24)

UNIT V

Components- Terms and Concepts, modeling executables and libraries, modeling tables, files and documents. Modeling an API.

Deployment- Terms and Concepts, modeling processors and devices, modeling the distribution of components.

Collaborations- Terms and Concepts, modeling the realization of a use case.

Component Diagrams- Terms and Concepts, modeling source code, modeling an executable release, modeling a physical database diagram.

Deployment Diagrams- Terms and Concepts, modeling an embedded system, modeling a client/server system, modeling a fully distributed system.

(Book1-Chapters: 25, 26, 27, 29, 30)

Suggested Readings:

1. Grady Booch, James Rumbaugh, Ivor Jacbson, The Unified Modeling Language User Guide, (Covering UML 2.0) 2nd Edition, Pearson Education, India, 2007.

2. Ivor Jacbson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, India, 2008.
3. Mark Priestley, Practical Object-Oriented Design with UML, McGraw Hill Education, 2005.
4. D Jeya Mala, S Geetha, Object Oriented Analysis and Design using UML, McGraw Hill Education, 2013.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA543 CO1: Acquire knowledge on overview & architecture of UML and to design the classes and relationships.

BCA543 CO2: Acquire knowledge on diagrams, advanced classes, advanced relationships, interfaces and packages.

BCA543 CO3: Be familiar with object diagrams, use cases, use case diagrams, interaction diagrams, activity diagrams.

BCA543 CO4: Be familiar with events and signals, state machines, process and threads, time and spaces, state chart diagrams.

BCA543 CO5: Be familiar with Collaborations, component diagrams and deployment diagrams.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: OOSD LAB
(w.e.f. 2026-27)

PAPER CODE: BCA543P **YEAR/SEMESTER: III/V**

COURSE OBJECTIVE: Analyze and design the problem by representing E-R Diagrams, DFD & UML diagrams.

UNIT-WISE COURSE OBJECTIVES:

COb1: To draw the UML diagrams for the given specifications.

COb2: To design appropriate design patterns and diagrams.

Students have to perform the following OOSD steps for the given list of Programs:

Select one Information System/Approach and device the following using UML tool:

1. Structured Diagrams (Data Flow Diagrams, Entity-Relationship Diagrams) etc.
2. Preparation of Software Requirement Specification Document for a given Case Study.

UML Diagrams

1. Use Case Diagrams
2. Class Diagrams
3. Object Diagrams
4. Sequence Diagrams
5. Collaboration Diagrams
6. Activity Diagrams
7. State Chart Diagrams
8. Component Diagrams
9. Deployment Diagrams

Problems That May Be Considered Are:

1. Passport Automation System.

Passport Automation System is an interface between the Applicant and the Authority responsible for the Issue of Passport. It aims at improving the efficiency in the Issue of Passport and reduces the complexities involved in it to the maximum possible extent.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

2. Book Bank

The book bank management system is software in which a member can register themselves and then he can borrow books from the book bank. It mainly concentrates on providing books for Degree students.

The book bank holds an online interface with its members for maintaining all kinds of transaction details. Each member is provided with a unique user id at the time of registering as a member.

3. Exam Registration

The main objective of Exam Registration System is to make applicants register themselves and apply for the exam. Exam Registration System provides easy interface to all the users to apply for the exam easily.

Exam Registration System is an interface between the Student and the Exam Controller responsible for the Issue of Hall Ticket. It aims at improving the efficiency in the Issue of Hall ticket and reduces the complexities involved in it to the maximum possible extent.

4. Stock Maintenance System

Stock Maintenance System is a real time application used in the merchant's day to day system. This is a database to store the transaction that takes places between the Manufacturer, Dealer and the Shop Keeper that includes stock inward and stock outward with reference to the dealer. It provides a complete version of a stock management system and to manage the entire stock management process of a company.

5. Online Course Reservation System

The aim is to design a course registration system for the admission of students in XYZ College of Technology for the academic year.All the processes involved in the course registration system is computerized. It must contain all the details about: Student, Course offerings, Registering a course , Availability of courses , Eligibility for Admission

6. E-Book Management System

E-book Management System gives an idea about how books are maintained in the particular websites. The books that are to be purchased, the books that are to be sold are maintained here. Further some additional details of the current books that is available in the store are also given.

7. BPO Management System

A call center is a centralized office used for the purpose of receiving and transmitting a large volume of request by telephone. A BPO is operated by a company to administer product support or information inquiries from customers. Outgoing calls for telemarketing, client and dept collection are also made. A BPO is often operated through an extensive open workspace for call center agents, with work stations that include a computer for each agent, a telephone set/headset connected to a telecom switch and one or more supervisor stations. It can be independently operated or networked with additional centers, often linked to a corporate computer network, including mainframes, micro computers and LANS

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

8. Library Management System

The purpose of the Library Management System is mainly to provide automation to the library. The categories of users provided are:

LIBRARIAN: He can read or write the information about any member and can update, delete or create a membership plan.
MEMBER: He can get a book issued.
The three major components in the application are: Login, Issue/Borrow Book, and Balance Dues
The Library Management System implements databases to make the existing system more efficient. It is difficult to catch defaulters in a usual library system, but Library Management System solves this problem by providing messages to the administrator about the fine to be paid and books to be returned.

9. Student Information System

The Student Management System can handle all the details about a Student. The details include College details, Course details, Students personal details, Academic details etc., The Student Management System is an automated version of manual Student Management System. The student management system allows authorized members to access the record of academically registered students.

10. Hospital Management System

Hospital Management System is an organized computerized system designed and programmed to deal with day-to-day operations and management of the hospital activities. The program can look after inpatients, outpatients, records, database treatments, status illness, billings in the pharmacy and labs. It also maintains hospital information such as ward id, doctors in charge and department administering.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA 543P CO1: Find solutions to the problems using object-oriented approach.

BCA 543P CO2: Represent UML notations and interact with the customer to refine the UML diagrams.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: SOFTWARE QUALITY TESTING
(w.e.f. 2026-27)

PAPER CODE: BCA544 **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge in students to develop software and its Quality.

UNIT-WISE COURSE OBJECTIVES:

COb1: To learn different process models and software quality.

COb2: To understand how to build software quality metrics and project management

COb3: To distinguish different levels of testing.

COb4: To integrate the Test Plan and Management.

COb5: To explain Software Configuration Management

UNIT I

Introduction to Software Quality: Software Quality, Defining Quality –Total Quality Management – Software Processes Models (Waterfall Model, Spiral Model, Iterative and Object-Oriented Model) – Achieving Software Quality- Quality Standards, Practices & Conventions –Improving Quality with Methodologies – Structured/Information Engineering – Measuring Customer Satisfaction.
(Book 2: Chapters: 2, 14) (Book 3: Chapter: 14)

UNIT II

Software Quality Metrics and Reliability: Writing Software Requirements and Design Specifications – Analyzing Software Documents Using Inspections and Walkthroughs – Software Metrics – Lines of Code, Qualityand Quality Management Metrics, Project Management.
(Book 2: Chapters: 11, 12)

UNIT III

Test Case Design: Testing Fundamentals – Defects – Strategies and Methods for Black Box Test Case Design – Strategies and Methods for White-Box Test Case Design– Levels of Testing and different Types of Testing (Unit Testing. Integration Testing, System Testing, Functional, stress, Performance Testing, Security Testing)
(Book 1 - Chapters: 4, 5, 6)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT IV

Test Management: Testing and Debugging Goals and Policies – Test Planning – Test Plan Components– Test Plan Attachments – Locating Test Items – Reporting Test Results – The Role of Three Groups in Test Planning and Policy Development – Process and the Engineering.
(Book 1 - Chapter: 7)

UNIT V

Controlling and Monitoring: Measurement and Milestones for Controlling and Monitoring (coverage measures, Test case development, Test case Execution, Measurements for monitoring testing costs, errors, faults and failures) – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of Reviews – Developing a Review Program – Components of Review Plans – Reporting Review Results.
(Book 1 - Chapters: 9, 10)

Suggested Readings:

1. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
2. StephenKan, "Metrics and Models in Software Quality", Addison-Wesley, 2nd Edition, 2004.
3. Pressman Roger, "Software Engineering", 7th Edition, 2010.
4. Milind Limaye, "Software Quality Assurance", McGraw Hill, 2011.
5. M G Limaye, "Software Testing – Principles, Techniques and Tools", McGraw Hill,2011.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA544 CO1: Describe different process models and software quality.

BCA544 CO2: Summarize how to build Software Quality Metrics and Project Management.

BCA544 CO3: Paraphrase different levels of Testing.

BCA544 CO4: Integrate the Test plan and Management.

BCA544 CO5: Implement Software Configuration Management and Monitor Testing Tools.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: MOBILE COMPUTING (ELECTIVE I)
(w.e.f. 2026-27)

PAPER CODE: BCA545a **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: 'To enrich students with the concepts of mobile application development and make sure they develop simple mobile applications.

UNIT-WISE COURSE OBJECTIVES:

COb1: To explain the basics of wireless communication and the benefits of next generation wireless systems over the previous.

COb2: To describe protocols and mechanisms developed for the network layer to support mobility.

COb3: To inculcate different approaches that lead to device development, content availability and service deployments.

COb4: To explain how this language is suitable for use in wireless environment, how to provide a more dynamic and responsive interface.

COb5: To illustrate the approaches for delivering the content to the client.

UNIT I

Introduction to Mobile Computing: Applications, History of mobile communications, A simplified Reference Model.
Wireless Transmission – Introduction to Radio Transmission Frequencies, Signals, Antennas, introduction to Signal Propagation, Multiplexing, Basics of Modulation, Spread spectrum, cellular systems
Medium Access Control – Specialized MAC, SDMA, FDMA, CDMA
(Book 2 – Chapters: 1, 2, 3)

UNIT II

Wireless LAN - Infrared Vs Radio Transmission, Infrastructure and Ad-Hoc Network, IEEE 802.11, Introduction to HIPERLAN and Bluetooth.
Mobile Network Layer: Mobile IP - Goals, Assumptions, Requirements, Entities and Terminologies, IP Packet Delivery, Agent Discovery, Registration, Tunneling and

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Encapsulation, Optimization, Reverse Tunneling. Dynamic Host Configuration Protocol. Mobile Ad-hoc Networks.
Mobile Transport Layer – Traditional TCP, Classical Traditional Improvements - Indirect TCP, Snooping TCP, Mobile TCP.
(Book 2 – Chapters: 7, 8, 9)

UNIT III
Wireless Application Protocol - WAP Architecture, Components of WAP standard, Design principles.
The Wireless Markup Language – The WML Document Model, WML Basics, Controls, Application Security.
(Book 1- Chapters: 6, 7)

UNIT IV
Wireless binary extensible markup language: Overview, Content Structure, Document Structure.
Enhanced WML: WML Script - Language Basics, WML Script Standard Libraries.
User interface design - Structured Usability methods, User Interface Design Guidelines.
(Book 1 – Chapters: 8, 9, 10)

UNIT V
Tailoring content to client: **Push Messaging**-Overview of WAP Push, Push Access Protocol and Push Over-the-Air Protocol.
Wireless Telephony Applications- Overview of WTA Architecture, WTA Client Framework.
Building and deploying End-to-End WAP services- Mapping Deployment Chain to the business Value Chain, Security Domains.
(Book 1- Chapters: 11, 12, 13. 14)

Suggested Readings:

1. Sandeep Singhal, Thomas Bridgeman, The Wireless Application Protocol, 6th Edition, 2010.
2. Jochen Schiller, Mobile Communications, 2nd Edition, 2009.
3. Rajkamal, Mobile Computing, Oxford University, 3rd Edition, 2018.
4. Stojmenovic, Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley, 2002.

COURSE OUTCOMES:
At the end of the course students will be able to:

BCA545a CO1: Summarize the basics of Wired and Wireless Communication.

BCA545a CO2: Familiarize Mobile Network and Transport layers.

BCA545a CO3: Paraphrase content management and services provided.

BCA545a CO4: Develop a dynamic and more responsive interface.

BCA545a CO5: Explore the various methods of delivering the content to the clients.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

PROGRAM NAME: BCA
COURSE NAME: INTERNET OF THINGS(IoT) (ELECTIVE I)
(w.e.f. 2026-27)

PAPER CODE: BCA545b **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: Enable students to acquire knowledge on Internet of Things, IoT Physical Devices & Endpoints and Case Studies of IoT Design.

UNIT-WISE COURSE OBJECTIVES:

COb1: To Introduce basic knowledge on Internet of Things and Physical Design of IoT.

COb2: To acquire knowledge on IoT and M2M Communications.

COb3: To explain the NETCONF-YANG and IoT Platforms Design Methodology.

COb4: To infer about IoT Physical Devices & Endpoints.

COb5: Case Studies on IoT Design and Introduce Data Analytics for IoT.

UNIT I

Introduction to Internet of Things: Introduction, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates.
Domain Specific IoTs: Energy, Retail, Industry, Health and Lifestyle.
(Book 1-Chapters: 1, 2)

UNIT II

IoT and M2M: Introduction to M2M, Difference between IoT and M2M, SDN and NFV for IoT.
Machine–to-Machine(M2M) Communications: MQTT, Quality of service (QoS), Wills, Reconnecting, BBB MQTT Publisher Client, Adding MQTT Features to the Application, MQTT Brokers, MQTT Dashboard.
(Book1-Chapter: 3, Book 2-Chapter: 11)

UNIT III

IoT System Management with NETCONF-YANG: Need for IoT Systems Management, SNMP, Network Operator requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG.
IoT Platforms Design Methodology: Introduction, IoT Design Methodology, Case Study on IoT system for weather Monitoring.
(Book 1-Chapter: 4, 5)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT IV

IoT Physical Devices & Endpoints: What is an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, programming Raspberry Pi with Python-controlling LED wth Rasperry Pi.

IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs, WAMP- AutoBahn for IoT, Xively Cloud for IoT Python Web Application Framework- Amazon Web Services for IoT-Amazon EC2, Amazon Auto scaling, Amazon S3, Amazon RDS.

(Book 1-Chapters: 7, 8)

UNIT V

Case Studies of IoT Design: Home Automation-Smart Lighting, Cities-Smart Parking, Environment-Weather Monitoring System, Agriculture.

Data Analytics for IoT: Introduction to Data Analytics for IoT, Apache Hadoop, Apache Oozie, Apache Spark, Apache Storm,

(Book 1-Chapters: 9, 10)

Suggested Readings:

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things – A Hands-on Approach, Universities Press, 2015.
2. Donald Norris, The Internet of Things, McGraw-Hill Education, 2015.
3. Graham Meikle, Mercedes Bunz, The Internet of Things, 1st Edition, 2017.
4. Rajkumar Buyya, Amir Vahid Dastjerdi, Internet of Things, 1st Edition, 2016.
5. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, 1st Edition, 2013.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA545b CO1: Correlate Internet of Things and Physical Design of IoT.

BCA545b CO2: Implement M2M Communications.

BCA545b CO3: Understand NETCONF-YANG and IoT Platforms Design Methodology.

BCA545b CO4: Design IoT Physical Devices & Endpoints.

BCA545b CO5: Comprehend knowledge of IoT design using Case Studies and Data Analytics for IoT.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

PROGRAM NAME: BCA
COURSE NAME: DATA MINING (ELECTIVE I)
(w.e.f. 2026-27)

PAPER CODE: BCA545c **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To imbibe students with the knowledge of Data Mining Concepts.

UNIT-WISE COURSE OBJECTIVES:

COb1: To learn the Functionalities and issues of Data Mining.

COb2: To explain the usage of Frequent Item set Mining methods and Association Rules.

COb3: To elucidate the importance of Classification and Prediction.

COb4: To analyze major clustering methods.

COb5: To discuss the applications and Trends in Data Mining.

UNIT I

Introduction: Introduction to Data Mining -What Motivated Data Mining, Why is it important, what is Data Mining, Kind of Data – Data Mining on what kind of Data, Data Mining Functionalities—What Kinds of Patterns can be Mined, Interesting Patterns – Are All of the Patterns Interesting, Task Primitives – Data Mining Task Primitives, Issues in Data Mining - Major Issues in Data Mining. **Data Preprocessing** -Why Preprocess the Data.
(Book 1-Chapters: 1, 2)

UNIT II

Association Rules: Mining Frequent Patterns: Associations and Correlations - Basic Concepts, Market Basket Analysis, Frequent Item sets, Closed Item sets, and Association Rules. Frequent Item Set Mining Methods – The Apriori Algorithm, Generating Association Rules from Frequent Item sets, Improving the Efficiency of Aprior, Mining Frequent Item sets without Candidate Generation, Mining Frequent Item Sets Using Vertical Data Format, Mining Closed Frequent Item sets, Mining Various Kinds of Association Rules- Mining Multilevel Association Rules, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses.
(Book 1-Chapter: 5)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT III

Classification and Prediction: Issues Regarding Classification and Prediction, Preparing the Data for Classification and Prediction, Comparing Classification and Prediction Methods, Classification by Decision Tree Induction –Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Bayesian-Bayesian Classification, Bayes' Theorem, Naïve Bayesian Classification, Rule Based Classification –Using IF-THEN Rules for Classification, Rule Extraction from a Decision Tree, Support Vector Machine-The Case When the Data are Linearly Separable, The Case When the Data are Linearly Inseparable
(Book 1-Chapter: 6)

UNIT IV

Cluster Analysis: What is Cluster Analysis, Types of Data in Cluster Analysis –Interval-Scaled Variables, Binary Variables, Categorical Variables, A Categorization of Major Clustering Methods, Partitioning Methods – Classical Partitioning Methods: k-Means and k-Medoids, Hierarchical Methods- Agglomerative and Divisive Hierarchical Clustering
(Book 1-Chapter: 7)

UNIT V

Applications and Trends in Data Mining: Data Mining Applications –Data Mining for Financial Data Analysis, Data Mining for the Retail Industry, Data Mining for the Telecommunication Industry, Data Mining for Intrusion Detection, Data Mining System Products and Research Prototypes- How to Choose a Data Mining System, Additional Themes on Data Mining-Theoretical Foundations of Data Mining, Statistical Data Mining, Visual and Audio Data Mining, Social Impacts of Data Mining- Ubiquitous and Invisible Data Mining, Data Mining, Privacy, and Data Security
(Book 1-Chapter: 11)

Suggested Readings:

1. Jiawei Han and Micheline Kamber, "Data Mining – Concepts and Techniques", 2nd Edition, Morgan Kaufmann Publishers, 2006.
2. Margaret. H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education. 2006.
3. Pang-Ning Tan Michael Steinbach Anuj Karpatne Vipin Kumar, "Introduction to Data Mining", 2nd Edition, 2021
4. D. Hand, H. Mannila and P. Smyth, "Principles of Data Mining", PrenticeHall. 2001.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA545c CO1: Explain the Functionalities and issues of Data Mining

BCA545c CO2: Summarize and synthesize the concepts of Frequent Item set Mining methods and Association Rules

BCA545c CO3: Elucidate the importance of Classification and Prediction

BCA545c CO4: Describe major clustering methods

BCA545c CO5: Discuss the applications and Trends in Data Mining

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: DISTRIBUTED DATABASE SYSTEMS (ELECTIVE I)
(w.e.f. 2026-27)

PAPER CODE: BCA545d **PPW: 4**
YEAR/SEMESTER: III/V **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To equip students with a foundational and practical understanding of distributed database architecture, design, query processing, and system integration.

UNIT-WISE COURSE OBJECTIVES:

COb1: Understand the core concepts, promises, and challenges of distributed database systems.

COb2: Learn design techniques including fragmentation, allocation, and integration strategies.

COb3: Explore distributed query processing, optimization, and transaction management.

COb4: Analyze various distributed DBMS architectures and their real-world applications.

COb5: Gain hands-on skills in schema matching, data cleaning, and distributed data handling.

UNIT I: Foundations of Distributed Databases

Introduction to Distributed Data Processing, Distributed Database System, History of Distributed DBMS, Data Delivery Alternatives. **Promises of DDBSs:** Transparent Management of Distributed and Replicated Data, Reliability Through Distributed Transactions, Improved Performance, Scalability. **Design Issues**: Distributed Database Design, Distributed Data Control, Distributed Query Processing, Distributed Concurrency Control, Reliability of Distributed DBMS Replication, Parallel DBMSs, Database Integration, Alternative Distribution Approaches, Big Data Processing and NoSQL. **Distributed DBMS Architecture**: Architectural Models for Distributed DBMSs and Client/Server, Peer-to-Peer and Multidatabase Systems, Cloud Computing.
(Book 1 - Chapter: 1)

UNIT II: Distributed Data Control and Distributed Transaction Processing

Distributed Data Control: View Management: Views in Centralized DBMSs, Views in Distributed DBMSs, Maintenance of Materialized Views, **Access Control:** Discretionary Access Control, Mandatory Access Control, Distributed Access Control, Semantic. **Integrity Control**: Centralized Semantic Integrity Control, Distributed Semantic Integrity Control.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Distributed Transaction Processing: Background and Terminology. **Distributed Concurrency Control**: Locking-Based Algorithms, Timestamp-Based Algorithms, Multiversion Concurrency Control, Optimistic Algorithms. **Distributed DBMS Reliability:** Two-Phase Commit Protocol, Variations of 2PC, Dealing with Site Failures, Network Partitioning.
(Book 1 - Chapters: 3, 5)

UNIT III : Data Replication and Database Integration
Data Replication: Consistency of Replicated Databases: Mutual Consistency, Mutual Consistency Versus Transaction Consistency, Update **Management Strategies**: Eager Update Propagation, Lazy Update Propagation, Centralized Techniques, Distributed Techniques.
Database Integration: Bottom-Up Design; Schema Matching, Schema Integration, Schema Mapping, Data Cleaning.

(Book 1 - Chapters: 6, 7)

UNIT IV: Parallel Database Systems and Peer-to-Peer Data Management
Parallel Database Systems: Architectures of Parallel DBMS: General Architecture, Shared-Memory, Shared-Disk, Shared-Nothing, Data Placement. **Parallel Query Processing:** Parallel Algorithms for Data Processing, Parallel Query Optimization. **Load Balancing:** Parallel Execution Problems, Intraoperator Load Balancing, Interoperator Load Balancing, Intraquery Load Balancing, Fault Tolerance. **Database Clusters:** Database Cluster Architecture, Replication, Load Balancing, Query Processing.
Peer-to-Peer Data Management: Infrastructure: Unstructured P2P Networks, Structured P2P Networks, Superpeer P2P Networks, Comparison of P2P Networks, Schema **Mapping in P2P Systems:** Pairwise Schema Mapping, Mapping Based on Machine Learning Techniques, Common Agreement Mapping, Schema Mapping Using IR Techniques.
(Book 1 - Chapters: 8, 9)

UNIT V: Web Data Management
Web Graph Management. **Web Search**: Web Crawling, Indexing, Ranking and Link Analysis, Evaluation of Keyword Search. **Web Querying:** Semi structured Data Approach, Web Query Language Approach, Question Answering Systems, Searching and Querying the Hidden Web: Crawling the Hidden Web, Metasearching. **Web Data Integration:** Web Tables/Fusion Tables, Semantic Web and Linked Open Data, Data Quality Issues in Web Data Integration.
(Book 1 - Chapter: 12)

Suggested Readings:

1. Principles of Distributed Database Systems, M. Tamer Özsu and Patrick Valduriez, Springer, 4th Edition, 2020.
2. Fundamentals of Database Systems, Ramez Elmasri, Shamkant B. Navathe, Pearson Education, 7th Edition, 2016.
3. Distributed Database Management Systems: A Practical Approach, Saeed K. Rahimi, Frank S. Haug, Wiley, 1st Edition, 2010.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA545c CO1: Acquire knowledge on the concepts, advantages, and challenges of distributed database systems.

BCA545c CO2: Design efficient distributed schemas using fragmentation and allocation techniques.

BCA545c CO3: Use optimization techniques to improve the efficiency of distributed queries.

BCA545c CO4: Compare different DDBMS architectures and choose suitable models for applications.

BCA545c CO5: Execute integration of diverse databases using schema mapping and data cleaning tools.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: INFORMATION SECURITY
(w.e.f. 2026-27)

PAPER CODE: BCA641 **PPW: 4**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge to students on the importance of Information Security.

UNIT-WISE COURSE OBJECTIVES:

COb1: To identify the need of security for an Information System.

COb2: To infer various laws and ethics in Information Security and its Risk Management factors.

COb3: To discuss and plan for security by implementing Security Technology.

COb4: To describe various Cryptographic Algorithms and Tools.

COb5: To enumerate the concepts of Information Security and Maintenance.

UNIT I

Introduction to Information Security: History, What is Security, CNSS Security Model, Components of an Information System, Balancing Information Security and Access, The SDLC, The security SDLC.

The Need for Security: Introduction, Business Needs First, Threats, Attacks- Secure Software Development.

(Book 1- Chapters: 1, 2)

UNIT II

Legal, Ethical and professional Issues in Information Security: Introduction, Law and Ethics in Information Security, Relevant U.S Laws, International Laws and Legal Bodies, Ethics and Information Security.

Risk Management: Introduction, An Overview of Risk Management, Risk Identification, Risk Assessment, Risk Control Strategies, Selecting a Risk Control Strategy, Quantitative versus Qualitative Risk Control Practices, Risk Management Discussion Points, Recommended Risk Control Practices.

(Book 1- Chapters: 3, 4)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT III

Planning for Security: Information Security Policy, Standards and Practices, The Information Security Blueprint, Security Education, Training and Awareness Program, Continuity Strategies.

Security Technology-Firewalls and VPNs: Introduction, Access Control, Firewalls, Protecting Remote Connections.

(Book 1- Chapters: 5, 6)

UNIT IV

Security Technology-Intrusion Detection, Access Control and Other Security Tools: Introduction, Intrusion Detection and Prevention Systems, Honeypots, Honeynets, and Padded Cell Systems, Scanning and Analysis Tools, Biometric Access Controls.

Cryptography: Introduction, Foundations of Cryptology, Cipher Methods, Cryptographic Algorithms, Cryptographic Tools, Protocols for Secure Communications, Attacks on Cryptosystems.

(Book 1- Chapters: 7, 8)

UNIT V

Implementing Information Security: Introduction, Information Security Project Management, Technical Aspects of Implementation, Non-Technical Aspects of Implementation, Information Systems Security Certification and Accreditation.

Security and Personal: Introduction, Positioning and Staffing the Security Function, Employment Policies and Practices, Internal Control Strategies.

Information Security Maintenance: Introduction, Security Management Maintenance Models, Digital Forensics.

(Book 1- Chapters: 10, 11, 12)

Suggested Readings:

1. Michael E Whitman and Herbert J Mattord, Principles of Information Security, Cengage Learning, 6th Edition, 2017.
2. Thomas R Peltier, Justin Peltier, John Blackley, Information Security Fundamentals, Auerbach Publications, 2010.
3. Detmar W Straub, Seymour Goodman, Richard L Baskerville, Information Security, Policy, Processes and Practices, PHI, 2008.
4. Mark Merkow and Jim Breithaupt, Information Security Principle and Practices, Pearson Education, 2007.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA641 CO1: Analyze the priority given to Security in Information System.
BCA641 CO2: Interpret various Security related laws and risk management in Information System.
BCA641 CO3: Implement security through security technology.
BCA641 CO4: Apply various Cryptographic Algorithms and Tools.
BCA641 CO5: Describe Information Security and Maintenance.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: ADVANCED JAVA PROGRAMMING
(w.e.f. 2026-27)

PAPER CODE: BCA642 **PPW: 4**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge in students to develop client server applications.

UNIT-WISE COURSE OBJECTIVES:

COb1: To illustrate the concepts of connecting database through java programming.

COb2: To demonstrate web applications using java servlets.

COb3: To illustrate web applications using java server pages.

COb4: To describe the concepts on the usage of JSTL tags.

COb5: To describe the concepts of Java Server Faces (JSF), Struts, Springs and Hibernate.

UNIT I

Getting Started with JDBC: Introducing JDBC- Describing Components of JDBC, Features of JDBC. JDBC Architecture - Types of Drivers, Advantages and Disadvantages of Drivers, Use of Drivers.

Implementing JDBC Statements and Methods: Statement Interface, PreparedStatement Interface, CallableStatement Interface, Working with ResultSet Interface.

(Book 1-Chapters: 2, 4)

UNIT II

Understanding Java Servlet: Introducing CGI, Introducing Java Servlet, Advantages of Servlet over CGI, Features of Servlet. Introducing Servlet API - Javax.servlet package, Javax.servlet.http package, Servlet Lifecycle, Working with GenericServlet class methods.

Understanding Request Processing and HTTP: Understanding Request Dispatching, Dispatching the Request, Working with HttpServletRequest, Working with HttpServletResponse, Describing HttpServlet – The HttpServlet Lifecycle.

Handling Sessions in Servlet: Introducing Session Tracking, Describing Cookies, HttpSession.

(Book 1-Chapters: 6, 7, 8)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT III

Introduction to JSP: - Advantages of JSP over Servlet, JSP Architecture, JSP Life Cycle.
Working with JSP Tags and Implicit Objects: Exploring Scripting Tags, Exploring Implicit Objects in JSP, Exploring Directive Tags.
(Book 1-Chapters: 10, 11)

UNIT IV

Working with JSTL: JSTL Core Tags - General-Purpose Tags, Conditional and Looping Tags, Networking Tags, JSTL SQL Tags, JSTL Formatting Tags, JSTL XML Tags. Custom Tags: Empty Tag, Body Content Tag, Iteration Tag, Simple Tag.
(Book 1-Chapters: 16, 13)

UNIT V

Working with JSF: Features of JSF, JSF Architecture, Describing JSF Elements, JSF Request Processing Life cycle, JSF Tag Libraries-JSF HTML Tags.
Introduction to Spring Frameworks: Introduction, Introducing Spring Framework, Benefits of Spring Framework, Spring Framework Overview.
Understanding Hibernate: What is ORM, Main Features of ORM, Object/Relational Mapping, Understanding Hibernate Architecture.
(Book 1-Chapter: 17, Book 2-Chapters: 1, 7)

Suggested Readings:

1. Santosh Kumar K, JDBC, Servlets and JSP Black Book, New Edition, Dreamtech Publication, 2016.
2. Santosh Kumar K, Spring and Hibernate, McGraw Hill Education, 2017.
3. Jitendra Patel, Advanced Java, Kindle Edition, 2016.
4. Uttam K Roy, Advanced Java Programming, Oxford University Press, 2015.
5. Brayan Basham, Kathy Sierra, Bert Bates, Head First Servlets and JSP, O'Reilly Media, Latest Edition, 2005.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA642 CO1: Apply JDBC Concepts.

BCA642 CO2: Program Java Servlets.

BCA642 CO3: Create programs using Java Server Pages.

BCA642 CO4: Compile programs using JSTLTags.

BCA642 CO5: Apply JSF Tags.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: ADVANCED JAVA PROGRAMMING LAB
(w.e.f. 2026-27)

PAPER CODE: BCA642P **YEAR/SEMESTER: III/VI**

COURSE OBJECTIVE: To impart knowledge in students on the execution process of client server applications.

UNIT-WISE COURSE OBJECTIVES:

COb1: To demonstrate connecting database and implementing servlets.

COb2: To illustrate the usage of Java Server Pages and JSTL.

1. Jdbc program to connect the Oracle database.
2. Create a new database table using JDBC.
3. Jdbc program to insert records into database.
4. Jdbc program to update records in database.
5. Jdbc program to delete records from database.
6. Jdbc program to read the data from database using ResultSet.
7. Jdbc program to demonstrate PreparedStatement.
8. Jdbc program to demonstrate CallableStatement.
9. Installation and Configuring Apache Tomcat Server.
10. Installation and Configuring Netbeans, MyEclipse IDEs.
11. Servlet program to print "Hello World".
12. Program to demonstrate Servlet Lifecycle methods.
13. Servlet Program to demonstrate Session Tracking.
14. Servlet Program to demonstrate Cookies.
15. Servlet Program to demonstrate RequestDispatcher.
16. Program to demonstrate JSP scripting elements.
17. Program to demonstrate JSP implicit objects.
18. JSP program to process the Form.
19. Develop simple application to process the registration form using JSP and JDBC with the help of IDE.
20. JSP program to demonstrate JSTL.

COURSE OUTCOMES:
At the end of the course students will:

BCA642P CO1: Develop applications using JDBC and Servlets.
BCA642P CO2: Implement the concepts of Java Server Pages and JSTL.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: BIG DATA ANALYTICS (ELECTIVE II)
(w.e.f. 2026-27)

COURSE CODE: BCA643a **PPW: 4**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge in students with the concepts of big data, handling huge data for analytics.

UNIT-WISE COURSE OBJECTIVES:

COb1: To inculcate knowledge on big data and technologies for handling Big Data.

COb2: To demonstrate the concepts of Hadoop Ecosystem, HDFS and Hbase.

COb3: To inculcate knowledge on MapReduce Fundamentals, HBase and Big Data Stack.

COb4: To illustrate the concepts of big data analytics and the usage of Big Data analytics in social media and text mining.

COb5: To discuss NoSQL Data Management and Hive Queries.

UNIT I

Getting an overview of Big Data: Introduction to Big Data, Structuring Big Data, Types of Data, Elements of Big Data, Big Data Analytics, Advantages of Big Data Analytics.
Introducing Technologies for Handling Big Data: Distributed and Parallel Computing for Big Data, Introducing Hadoop, HDFS and MapReduce, Hadoop Functionality, Cloud Computing and Big Data, Features of Cloud Computing, Cloud Deployment Models, Cloud Services for Big Data, Cloud Providers in Big Data Market.
(Book 1 - Chapters: 1, 3)

UNIT II

Understanding Hadoop Ecosystem: Hadoop Ecosystem, Hadoop Distributed File System, HDFS Architecture, Concept of Blocks in HDFS Architecture, Namenodes and Datanodes, The Command-Line Interface, Using HDFS Files, Hadoop Specific File System Types, HDFS COMmands, The org.apache.hadoop.io package, HDFS High Availability, Features of HDFS. MapReduce, Hadoop YARN, Introducing HBase - HBase Architecture, Regions, Storing Big Data with HBase, Interacting with the Hadoop Ecosystem, HBase in Operation- Programming with HBase, Combining HBase and HDFS, REST and Thrift, Data Integrity in HDFS, Features of HBase, Hive, Pig and Pig Latin, Sqoop, Zookeeper, Flume, Oozie.
(Book 1 - Chapter: 4)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT III

Understanding MapReduce Fundamentals and HBase: The MapReduce Framework, Exploring the features of MapReduce, Working of MapReduce, Techniques to optimize MapReduce Jobs, Hardware/Network Topology, Synchronization, File system, Uses of MapReduce, Role of HBase in Big Data Processing- Characteristics of HBase.

Understanding Big Data Technology Foundations: Exploring the Big Data Stack, Data Sources Layer, Ingestion Layer, Storage Layer, Physical Infrastructure Layer, Platform Management Layer, Security Layer, Monitoring Layer, Visualization Layer, Virtualization and Big Data, Virtualization Approaches.

(Book 1 - Chapters: 5, 6)

UNIT IV

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Reporting, Analysis, Analytic Process, Types of Analytics-Basic Analytics, Advanced Analytics, Operationalized Analytics, Monetized Analytics, Characteristics of Big Data Analysis, Points to consider during Analysis- Frame the Problem Correctly, Statistical Significance or Business Importance, Making Inferences versus Computing Statistics, Developing an Analytic Team-Skills Required for an Analyst, Convergence of IT and Analytics. Understanding Text Analytics.

Social Media Analytics and Text Mining: Introducing social media, Key elements of social media, Introducing Text Mining, Understanding Text Mining Process, Sentiment Analysis.

(Book 1 - Chapter: 18, 28)

UNIT V

NoSQL Data Management: Introduction to NoSQL, Benefits and Challenges of NoSQL, Characteristics of NoSQL, History of NoSQL, Types of NoSQL Data Models, Key Value Data Model, Column-Oriented Data Model, Document Data Model, Graph Databases, Schema-Less Databases, Materialized Views, Distribution Models, CAP Theorem, Sharding.

Exploring Hive: Introducing Hive, Data Types in Hive, Hive DDL, Creating Databases, Viewing a Database, Dropping a Database, Altering a Database, Creating Tables- External Table, Creating a Table Using the Existing Schema, Dropping Tables, Altering Tables, Rename Tables, Modify Columns, Add Columns, Replace Columns, Data Manipulation in Hive – Loading Files into Tables, Inserting Data into Tables(Simple Insert), Update in Hive, Delete in Hive, Data Retrieval Queries – Using the Select Command, Using the Where Clause, Using the Group By Clause, Using the Having Clause, Using the Limit Clause.

(Book 1 - Chapters: 15, 12)

Suggested Readings:

1. BIG DATA, Black BookTM, DT Editorial Services, DreamTech Press, 1st Edition, 2016.
2. SeemaAcharya, Subhashini Chellappan, BIG DATA and ANALYTICS, Wiley publications, 2nd Edition, 2015.
3. Nathan Marz and James Warren, BIG DATA- Principles and Best Practices of Scalable Real-Time Systems, 1st Edition, 2015.
4. Raj Kamal, Preeti Saxena, Bigdata Analytics: Introdution to Hadoop, Spark and Machine-Learning, McGraw Hill Education, 1st Edition, 2019.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

COURSE OUTCOMES:

At the end of the course students will:

BCA643a CO1: Acquire knowledge on big data and technologies for handling Big Data.

BCA643a CO2: Be familiar with Hadoop Ecosystem, HDFS and HBase.

BCA643a CO3: Comprehend MapReduce Fundamentals, HBase and Big Data Stack.

BCA643a CO4: Acquire knowledge on the usage of Big Data Analytics and the usage of big data analytics in social media and text mining.

BCA643a CO5: Outline NoSQL database Management and Hive Queries.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan
BHAVAN'S VIVEKANANDA COLLEGE
OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: BLOCKCHAIN TECHNOLOGY (ELECTIVE II)
(w.e.f. 2026-27)

PAPER CODE: BCA643b **PPW: 4**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge in students about Blockchain Technology.

UNIT-WISE COURSE OBJECTIVES:

COb1: To describe the concepts of Blockchain and Decentralized Systems.

COb2: To demonstrate Hash Functions and Consensus Methods.

COb3: To discuss Blockchain Components and its Allied Technologies.

COb4: To illustrate the concepts of Smart Contracts and Blockchain Usecases.

COb5: To analyze the concepts of Bitcoins and Decentralized Applications.

UNIT I

Basics of Blockchain: Introduction, Concept of Blockchain, History, Definition of Blockchain, Fundamentals of Blockchain, Characteristics of Blockchain, Consensus in Trust-Building Exercise; Public, Private, and Hybrid Blockchains, Distributed Ledger Technologies, DLT Decentralized Applications and Databases, Architecture of Blockchain, Transactions, Chaining Blocks, Value Proposition of Blockchain Technology.
Decentralized System: Introduction, Distributed Decentralized Databases, Decentralized Enterprise, Decentralization, Disintermediation, Decentralized Enterprise Regulation.
(Book 1-Chapters: 1, 2)

UNIT II

Hash Functions: Introduction, Hashing, Message Authentication Code, Secure Hash Algorithm (SHA-1), Secure Hash Algorithm Version, Distributed Hash Tables, Hashing and Data Structures, Hashing in Blockchain Mining.
Consensus: Introduction, Consensus Approach, Consensus Algorithms, Byzantine Agreement Methods.
(Book 1-Chapters: 3, 4)

UNIT III

Blockchain Components: Introduction, Ethereum, History, Ethereum Virtual Machine, Working of Ethereum, Ethereum Clients, Ethereum Key Pairs, Ethereum Addresses, Ethereum Wallets, Ethereum Transactions, Ethereum Languages, Ethereum Development Tools.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Blockchain and Allied Technologies: Blockchain and Cloud Computing, Characteristics of Blockchain Cloud, Blockchain and Artificial Intelligence, Blockchain and IoT, Blockchain and Machine Learning, Blockchain and Robotic Process Automation.
(Book 1-Chapters: 5, 11)

UNIT IV

Smart Contracts: Introduction, Smart Contracts, Absolute and Immutable, Contractual Confidentiality, Law Implementation and Settlement, Characteristics, Internet of Things, Utilities: Smart Grid, Proof of Origin, Supply Chain Management, Medical Sciences, Finance, Media and Entertainment, Public Services, Legal Services, Darknet, The Future.
Blockchain Vertical Solutions and Use Cases: Blockchain, Blockchain in Insurance, Assets Management, Smart Assets, Electronic Currency, Manufacturing.
(Book 1-Chapters: 7, 10)

UNIT V

Bitcoins: Introduction, Working of Bitcoin, Merkle Trees, Bitcoin Block Structure, Bitcoin Address, Bitcoin Transactions, Bitcoin Network, Bitcoin Wallets, Bitcoin Payments, Bitcoin Clients, Bitcoin Supply.
Decentralized Applications: Introduction, Today's Web Applications Requirement, Mining in Blockchain Bitcoin, Blocks Validation and Identification, Bitcoins Creation, Mining Hardware, Mining Software, Running Miner Software, Executing Several Miners, Bitcoins Management, Reasons for Bitcoin Mining, Swarm, Robotic Possibilities, Sidechain Hopping, Blockchain Fork.
(Book 1-Chapters: 8, 9)

Suggested Readings:

1. Kumar Saurabh, Ashutosh Saxena, Blockchain Technology Concepts and Applications, Wiley Publications, 1st Edition, 2020.
2. Daniel Hellwig, Goran Karlic, Arnd Huchzermeier, Build Your Own Blockchain – A Practical guide to Distributed Ledger Technology, Springer,2020.
3. Arshdeep Bahga, Vijay Madisetti, Blockchain Applications – A Hands-on Approach, VPT Publications, 2018.
4. Debajani Mohanty, Blockchain from Concept to Execution, BPB Publications, 2018.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA643b CO1: Explain the concepts of Blockchain and Decentralized Systems.

BCA643b CO2: Implement Hash Functions and Consensum Methods.

BCA643b CO3: Summarize Blockchain Components and its Allied Technologies.

BCA643b CO4: Paraphrase the concepts of Smart Contracts and Blockchain Usecases.

BCA643b CO5: Analyze Bitcoins and Decentralized Applications.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: MACHINE LEARNING (ELECTIVE – II)
(w.e.f. 2026-27)

PAPER CODE: BCA643c **PPW: 4**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To equip students with core machine learning concepts and algorithms for real-world classification, regression, and optimization tasks.

UNIT-WISE COURSE OBJECTIVES:

COb1: Understand ML basics, concept learning, and decision tree techniques.

COb2: Learn neural networks, backpropagation, and genetic algorithms.

COb3: Apply Bayesian learning, Naive Bayes, and EM algorithms.

COb4: Explore instance-based and analytical learning methods.

COb5: Study rule-based learning and reinforcement learning approaches.

UNIT I

BASICS: Learning Problems, Perspectives and Issues, Concept Learning, Version Spaces and Candidate eliminations, Inductive bias, Decision Tree learning, Representation, Algorithm, Heuristic Space Search.

(Book 1-Chapters: 1, 2, 3)

UNIT II

NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation, Problems, Perceptions, Multilayer Networks and Back Propagation Algorithms, Advanced Topics, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Models of Evolutions and Learning.

(Book 1-Chapters: 4, 9)

UNIT III

BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem, Concept Learning, Maximum Likelihood, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naive Bayes Classifier, Bayesian Belief Network, EM Algorithm, Probability Learning, Sample Complexity, Finite and Infinite Hypothesis Spaces, Mistake Bound Model.

(Book 1- Chapters: 6, 7)

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

UNIT IV

INSTANCE BASED AND ANALYTICAL LEARNING: K-Nearest Neighbor Learning, Locally Weighted Regression, Radial Bases Functions, Case Based Learning, Explanation Based Learning, Perfect Domain Theories, FOCL Algorithm.

(Book 1-Chapters: 8, 11)

UNIT V

ADVANCED LEARNING: Learning Sets of Rules, Sequential Covering Algorithm, Learning Rule Set, First Order Rules, Sets of First Order Rules, Induction on Inverted Deduction, Inverting Resolution, Reinforcement Learning, Task Learning, Temporal Difference Learning.

(Book 1-Chapters: 10, 12, 13)

Suggested Readings:

1. T. M. Mitchell, Machine Learning, McGraw-Hill, New York, 2017.
2. Oliver Theobald, Machine Learning for Absolute Beginners: A Plain English Introduction, 3rd Edition, 2024.
3. E. Alpaydin, Introduction to Machine Learning, 4th Edition, 2020.
4. T. Hastie, R. Tibshirani, and J. H. Friedman, The Elements of Statistical Learning, 2nd Edition, Springer, New York, 2009

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA643c CO1: Acquire knowledge on Machine Learning fundamentals, concept learning, and decision tree algorithms.

BCA643c CO2: Implement neural networks and apply genetic algorithms in learning.

BCA643c CO3: Apply Bayesian approaches, Naive Bayes, and EM for classification.

BCA643c CO4: Analyze instance-based and analytical learning techniques.

BCA643c CO5: Develop solutions using rule-based and reinforcement learning methods.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Accredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: MULTIMEDIA (ELECTIVE – II)
(w.e.f 2025-26)

PAPER CODE: BCA643d **PPW: 4**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 4**

COURSE OBJECTIVE: To impart knowledge in students about multimedia software and its use.

UNIT-WISE COURSE OBJECTIVES:

COb1: To explain basic multimedia components.

COb2: To contrast various software tools to present multimedia applications.

COb3: To analyze various vector graphic tools.

COb4: To synthesis virtual reality applications.

COb5: To explore audio functionality and its applications.

UNIT I

Introduction - Applications, Delivery, Multimedia Production, Interactivity Writer.
Multimedia Skills and Training - Project Manager, Multimedia Designer, Interface Designer, Writer, Video Specialist, Audio Specialist, Programmers.
Multimedia Hardware - Connections, Memory and Storage devices, Input, Output, Communication.
(Book 1-Chapters: 1, 2)

UNIT II

Multimedia Software - Basic Tools, Authoring Tools Text - Fonts and Faces.
Using Test in Multimedia- Font Editing and Design Tools.
Hypermedia and Hypertext Sound - Digitizing Sound, Processing Sound, Compression, Formats, MIDI.
(Book 1-Chapters: 7, 9, 12, 13)

UNIT III

Computer Graphics - Vector Graphics, Bitmapped Graphics, Combining Vectors and Bitmaps, File Formats.
Vector Graphics - Fundamentals, Shapes, Transformations and Filters, 3-D Graphics.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bitmapped Images - Resolution- Image Compression, Image manipulation, Geometric Transformations.
(Book 1- Chapters: 3, 4, 5)

UNIT IV

Introduction to Immersive Technologies - A Brief History of Virtual Reality, The five Classic Components of a VR System, Early Commercial VR Technology, VR Becomes an Industry, Reality, Virtuality and Immersion, VR, AR, MR, xR: similarities and differences, Current Trends and State of the Art in Immersive Technologies, Developing Platforms and Consumer Devices, The Future of Human Experience.
(Book 2-Chapter: 1, Book 3-Chapter: 8)

UNIT V

Sound in Immersive Environments - Evolution of Sound Systems, From Mono to Stereo to Surround, Object Based Sound, Ambisonics, HRTF, Sound Design Basics, Sound as Information, Earcons, Impact of Sound in Objects and Actions, Natural vs Real Sound.
(Book 2-Chapter: 13)

Suggested Readings:

1. Nigel Chapman, Jenny Chapman - Digital Multimedia, Wiley 2000.
2. Kelly S. Hale (Editor), Kay M. Stanney (Editor). Handbook of Virtual Environments: Design, Implementation, and Applications, 2nd Edition (Human Factors and Ergonomics), 2014.
3. Michael Heim. 1994. The Metaphysics of Virtual Reality.
4. Tay Vaughan - Multimedia: Making it Work, Fourth Edition, McGraw 1998.
5. T M Savage, K E Vogel – An Introduction to Digital Multimedia, 2nd Edition, 2014.

COURSE OUTCOMES:

At the end of the course students will be able to:

BCA643d CO1: Acquire knowledge on Multimedia Components.

BCA643d CO2: Summarize various Multimedia Software Tools.

BCA643d CO3: Categorize on Computer and Vector Graphics.

BCA643d CO4: Acquire knowledge on Immersive Technologies of Virtual reality.

BCA643d CO5: Acquire Knowledge on Audio tools and analyze sound environment.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: PROJECT WORK
(w.e.f. 2026-27)

PAPER CODE: BCA644 **PPW: 14**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 7**

Sixth Semester of the BCA course is exclusively meant for project work. Project has to be carried out by each student in a group consisting of 2 to 3 students for a period of 15 weeks duration. Students should submit a synopsis at the end of 2nd week in consultation with the Project Guide. The synopsis should consist of definition of the problem, scope of the problem and plan of action. After completion of eight weeks students are required to present a Project Seminar on the topic covering the aspects of analysis, design and implementation of the project work.

At the end of the semester the students are required to present themselves for a University Viva-voce examination.

A committee consisting of two faculty members of the respective college along with a guide will evaluate the project and award CIA marks.

Each student will be required to:

1. Submit one page of synopsis on the project work for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the project.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of CIA marks which will be on the basis of performance in all the 3 items stated above.

The project seminar presentation should include the following components of the project:

- Problem definition and specification.
- Literature survey, familiarity with research journals.
- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of bar (activity) charts.
- Presentation both oral and written.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri

APPENDIX

1. Project Report Template
2. Project Certificate Template
3. Guidelines for Project Work

Project Report

on

"Project Name"

Project work submitted in partial fulfilment of the requirement for the award of the degree.

Bachelor of Computer Applications(BCA)

By

Student Name & Roll No

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
Sainikpuri, Secunderabad-500094.
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
Sainikpuri, Secunderabad-500094.
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University

Department of Computer Science

CERTIFICATE

This is to Certify that the Project Work entitled

_____

Was successfully carried out by

_____

bearing the Hall Ticket No . _____

in partial fulfillment of the sessional requirements leading to the award of the degree

Bachelor of Computer Applications (BCA)

During the academic year 20 - 20

Internal Guide **Course Coordinator** **Principal**

External Examiner

Date:

Guidelines for Project Work

1. Documentation Format Guidelines

To maintain uniformity and a professional standard across all project submissions, students must strictly adhere to the following formatting rules:

a. Page Formatting

- **Alignment**: All text in the document should be aligned using the **"Justify"** alignment mode.
- **Margins**: Set page margins as follows:
  - **Top**: 1 inch
  - **Bottom**: 1 inch
  - **Left**: 1.5 inches
  - **Right**: 1.5 inches

b. Font and Size

- **Chapter Titles**: Times New Roman, Font Size **18**, **Bold**
- **Subtitles / Section Headings**: Times New Roman, Font Size **14**, **Bold**
- **Main Content / Body Text**: Times New Roman, Font Size **12**
- Ensure **consistent spacing** between lines (1.5 line spacing recommended).

c. Binding

- **Book binding** is compulsory.
- Binding should only be done **after thorough verification and approval** by the respective project guide.

2. Structure of the Project Report

The project documentation must follow a clear structure, which includes:

1. Title Page
2. College Certificate
3. Company Certificate
4. Acknowledgement
5. Declaration
6. Table of Contents
7. List of Figures / Tables (if applicable)
8. Abstract
9. About Organization
10. H/w & S/w Requirements
11. Introduction
12. Analysis
13. Design

14. Implementation
15. Testing
16. Maintenance
17. Conclusion & Future Scope
18. Bibliography / References
19. Appendices (if needed)

3. Additional Notes

- The report should be grammatically correct and plagiarism-free.
- Avoid overuse of screenshots—include only relevant and labelled images.
- Ensure logical flow and clarity of explanation.
- Use appropriate headings and subheadings to structure content.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
(Reaccredited with 'A' Grade by NAAC)
Autonomous College – Affiliated to Osmania University
Department of Computer Science

PROGRAM NAME: BCA
COURSE NAME: INDIAN CONSTITUTION
(w.e.f. 2026-27)

PAPER CODE: BCA645 **PPW: 1**
YEAR/SEMESTER: III/VI **NO. OF CREDITS: 0**

COURSE OBJECTIVE: To impart knowledge on the Indian Constitution.

UNIT-WISE COURSE OBJECTIVES:
COb1: Learn the basics of the constitution
COb2: Learn about rights and duties of Citizens.
COb3: Understand the structure of the union government.
COb4: Learning about State and Local Government.

UNIT I

The Constitution – Introduction, The History of the Making of the Indian Constitution, Preamble and the Basic Structure, and its Interpretation, Fundamental Rights and Duties and their interpretation, State Policy Principles.
(Book 1: Part I Chapters – 1, 3, 8, 14, 28)

UNIT II

Union Government - Structure of the Indian Union, President – Role and Power, Prime Minister and Council of Ministers, Lok Sabha and Rajya Sabha.
State Government - Governor – Role and Power, Chief Minister and Council of Ministers, State Secretariat, Local Government.
(Book 1: Part II Chapters – 11, 12, 13)

Suggested Readings:

1. Acharya Dr. Durga Das, Introduction to Indian Constitution of India, 26th edition, 2022.
2. D.D. Basu, Lexis Nexis, Introduction to the Constitution of India, 23rd Edition, 2018.
3. B.L. Fadia, Sahitya Bhawan, The Constitution of India, New Edition, 2017.
4. Rajeev Bhargava, Ethics and Politics of the Indian Constitution, Oxford University Press, New Delhi, 2008.

COURSE OUTCOMES: At the end of the course students will be able to:

BCA645 CO1: Explain the basics of the constitution.
BCA645 CO2: Skill to understand rights and responsibilities towards the nation.
BCA645 CO3: Elucidate the structure of the union government.
BCA645 CO4: Analyze Indian Governance Structure.

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.

CHAIRPERSON
BOS in Informatics
Bhavan's Vivekananda College
Sainikpuri