# UNIVERSITY OF RAJASTHAN, JAIPUR

## NATIONAL EDUCATION POLICY-2020

## PROPOSED STRUCTURE OF UG-BACHELOR OF COMPUTER APPLICATIONS (BCA) (Basic and Honours degree)

(Programme Code: UG0801)

Syllabus for 1st and 2nd Semesters

and

Open Elective Courses in Computer Application

SYLLABUS 2023

Faculty of Science

BCA Part First -2024

BCA Part Second -2025

BCA Part Third -2026

BCA Part Fourth -2027

1

# Preamble

Computer Application (CA) has been evolving as an important branch of science and technology in last three decade and it has carved out a space for itself like computer science and engineering. Computer application spans theory and more application and it requires thinking both in abstract terms and in concrete terms.

The ever -evolving discipline of computer application has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers and its applications, but finding a solution requires both computer science expertise and knowledge of the particular application domain.

Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Mathematical and Statistical Analysis, Data Science, Computational Science, and Software Engineering.

Universities and other HEIs introduced programmes of computer application. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavour has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge.

In India, it was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for trained engineering manpower in IT industries. Parallelly, BCA, BSc and MSc programmes with specialisation in Computer Science were introduced to train manpower in this highly demanding area.

BCA and BCA (Hons) are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS or MCA leading to research as well as R&D, can be employable at IT industries, or can pursue a teaching profession or can adopt a business management career.

BCA and BCA (Hons) aims at laying a strong foundation of computer application at an early stage of the career. There are several employment opportunities and after successful completion of BCA, graduating students can fetch employment directly in companies as programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Program outcomes in BCA are aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in BCA courses, in outcome-based curriculum framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.
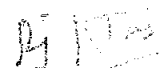
2

All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Curriculum Framework for BCA degrees is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation

- To develop the ability to use this knowledge to analyse new situations in the application domain

- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.

- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems

- To learn skills and tools like mathematics, statistics and electronics to find the solution, interpret the results and make predictions for the future developments

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate
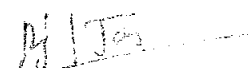
# The objectives of the Programme are:

1. The primary objective of this program is to prepare students for careers in software industry, understanding and skills, related to the use of computers and its applications.
2. The course is designed to function as an intermediate between the industry and academic institutes.
3. This course provides students with options to specialize in new and upcoming technologies.
4. To impart creativity and pursuit of excellence in computer applications.
5. To provide opportunity for the study of modern methods of information processing and its applications.
6. To develop among students the programming techniques and the problem solving skills through programming.
7. To develop the ability to use this knowledge to analyze new situations.
8. To be able to blend the acquired knowledge, understanding, and experience, for a better and improved intellectual capacity of the real-life problems.
9. To prepare students who wish to go on to further studies in computer science and related subjects.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

# Program Outcomes: BCA (3 Years) Degree

1. Discipline knowledge: Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity.

2. Problem Solving: Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.

3. Difficulty Analysis: Talent to classify, significantly evaluate and prepare complex computing problems using fundamentals of computer knowledge and request domains.

4. Design and Development of Solutions: Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.

5. Accomplish Investigations of Compound Computing Troubles: Ability to invent and ways experiments interpret data and present well up to date conclusions.

6. Application Systems Knowledge: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.

7. Modern Tool Usage: Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.

8. Mission Administration: Skill to recognize administration and computing philosophy with computing acquaintance to supervise projects in multidisciplinary environments.

9. Communication: Must have a reasonably good communication knowledge both in oral and writing.

10. Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.

11. Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

# Additional Program Outcomes: BCA Degree (Honours)

The Bachelor of Computer Application (BCA (Hons)) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation:
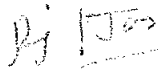
1. Implement standard Software Engineering practices and strategies in real-time software project development

2. Design and develop computer programs/computer based systems in the areas related to AI, algorithms, networking, web design, cloud computing and data analytics.

3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

4. In order to enhance programming skills of the young IT professionals, the concept of project development in using the technologies learnt during the semester has been introduced.

5. The ability to work independently on a substantial software project and as an effective team member.

6. Ability to identify, formulate, analyze and solve problems of programming using different languages.

7. The ability to enhance Research and Development activities,

8. In order to enhance Preparation and presentation of papers.

9. To encourage new innovative ideas and implement it.

10. To develop ability to Dissertation/Thesis preparation and writing.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

# Course Structure for BCA

## BCA Part - I 2023-24 Onwards

| Sem | Course Code | Course Title | Course Type | Theory/ Practical | Teaching Hours/ Week | Credits |
|---|---|---|---|---|---|---|
| **Semester-wise Titles of the Papers in Bachelor of Computer Application** | | | | | | |
| **Certificate in Computer Application** | | | | | | |
| I | BCA-51T-101 | Programming in C | CC | Theory | 4 | 4 |
| | BCA-51P-102 | Programming in C Lab | CC | Practical | 4 | 2 |
| | BCA-51T-103 | Web Application Development | CC | Theory | 4 | 4 |
| | BCA-51P-104 | Web Application Development Lab | CC | Practical | 4 | 2 |
| | BCA-51T-105 | Computer Fundamentals & Office Management Tools | DSE | Theory | 4 | 4 |
| | BCA-51P-106 | Office Management Tools Lab | DSE | Practical | 4 | 2 |
| | BCA-51T-107 | AEC1 | AEC | Theory | 4 | 4 |
| | BCA-51T-108 | SEC1 | SEC | Theory | 2 | 2 |
| | BCA-51T-109 | VAC1 | VAC | Theory | 2 | 2 |
| | | | **Total** | | 32 | 26 |
| II | BCA-52T-111 | Operating Systems | CC | Theory | 4 | 4 |
| | BCA-52P-112 | Operating Systems Lab | CC | Practical | 4 | 2 |
| | BCA-52T-113 | Database Management Systems | CC | Theory | 4 | 4 |
| | BCA-52P-114 | DBMS Lab | CC | Practical | 4 | 2 |
| | BCA-52T-115 | Computer Organization & Architecture | DSE | Theory | 6 | 6 |
| | BCA-52T-116 | AEC2 | AEC | Theory | 4 | 4 |
| | BCA-52P-117 | SEC2 | SEC | Practical | 4 | 2 |
| | BCA-52T-118 | VAC2 | VAC | Theory | 2 | 2 |
| | | | **Total** | | 32 | 26 |

## Semester-wise Titles of the Papers in Bachelor of Computer Application

### Diploma in Computer Application

| Semester | Course Code | Course Title | Course Type | Theory/ Practical | Teaching Hours/ Week | Credits |
|---|---|---|---|---|---|---|
| III | BCA-63T-201 | Data Structures and Algorithms | CC | Theory | 4 | 4 |
| | BCA-63P-202 | DS Lab Using C | CC | Practical | 4 | 2 |
| | BCA-63T-203 | Object Oriented Programming Using Java Programming | CC | Theory | 4 | 4 |
| | BCA-63P-204 | Java Lab | CC | Practical | 4 | 2 |
| | BCA-63T-205 | Software Engineering | DSE | Theory | 6 | 6 |
| | BCA-63T-206 | MEC1 | MEC | Theory | 4 | 4 |
| | BCA-63P-207 | SEC3 | SEC | Practical | 4 | 2 |
| | BCA-63T-208 | VAC3 | VAC | Theory | 2 | 2 |
| | | | | Total | 32 | 26 |
| IV | BCA-64T-211 | PHP Programming | CC | Theory | 4 | 4 |
| | BCA-64P-212 | PHP Lab | CC | Practical | 4 | 2 |
| | BCA-64T-213 | Python Programming | CC | Theory | 4 | 4 |
| | BCA-64P-214 | Python Lab | CC | Practical | 4 | 2 |
| | BCA-64T-215 | Mathematics & Statistics | DSE | Theory | 6 | 6 |
| | BCA-64T-216 | MEC2 | MEC | Theory | 4 | 4 |
| | BCA-64T-217 | SEC4 | SEC | Theory | 2 | 2 |
| | BCA-64T-218 | VAC4 | VAC | Theory | 2 | 2 |
| | | | | Total | 30 | 26 |

## Semester-wise Titles of the Papers in Bachelor of Computer Application

### Bachelor of Computer Application

| Semester | Course Code | Course Title | Course Type | Theory/ Practical | Teaching Hours/ Week | Credits |
|---|---|---|---|---|---|---|
| V | BCA-75T-301 | .NET Framework with C# | CC | Theory | 4 | 4 |
| | BCA-75P-302 | .NET with C# Lab | CC | Practical | 4 | 2 |
| | BCA-75T-303 | Introduction to Data Science | CC | Theory | 4 | 4 |
| | BCA-75P-304 | Data Science Lab | CC | Practical | 4 | 2 |
| | BCA-75T-305 | Artificial Intelligence & Expert System | DSE | Theory | 6 | 6 |
| | BCA-75T-306 | MEC3 | MEC | Theory | 4 | 4 |
| | | | Total | | 26 | 22 |
| VI | BCA-76T-311 | Machine Learning | CC | Theory | 4 | 4 |
| | BCA-76P-312 | Machine Learning Lab | CC | Practical | 4 | 2 |
| | BCA-76T-313 | Data Warehousing & Data Mining | CC | Theory | 4 | 4 |
| | BCA-76P-314 | Data Warehousing & Data Mining Lab | CC | Practical | 4 | 2 |
| | BCA-76T-315 | Data Communication & Computer Networks | DSE | Theory | 6 | 6 |
| | BCA-76T-316 | SEC5 | SEC | Theory | 2 | 2 |
| | | | Total | | 24 | 20 |

Dy. Registrar
(Academic)
University of Rajasthan
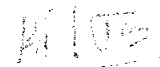JAIPUR

## Semester-wise Titles of the Papers in Bachelor of Computer Application (Honours)

### Bachelor of Computer Application(Honours)

| Semester | Course Code | Course Title | Course Type | Theory/ Practical | Teaching Hours/ Week | Credits |
|---|---|---|---|---|---|---|
| VII | BCA-87T-401 | Analysis and Design of Algorithms | CC | Theory | 4 | 4 |
| | BCA-87P-402 | ADA Lab | CC | Practical | 4 | 2 |
| | BCA-87T-4013 | Android Mobile Application Development | CC | Theory | 4 | 4 |
| | BCA-87P-404 | Mobile Application Development Lab | CC | Practical | 4 | 2 |
| | BCA-87T-405 | Adv. Java Programming | DSE | Theory | 4 | 4 |
| | BCA-87P-406 | Adv. Java Lab | DSE | Practical | 4 | 2 |
| | BCA-87T-407 | Druple: Content Management system | DSE | Theory | 4 | 4 |
| | BCA-87T-408 | Deep Learning | DSE | Theory | 4 | 4 |
| | | **Total Credits of VII Sem** | | | 32 | 26 |
| VIII | BCA-88T-411 | Big Data Analytics | CC | Theory | 4 | 4 |
| | BCA-88P-412 | Big Data Lab | CC | Practical | 4 | 2 |
| | BCA-88T-413 | IOT | CC | Theory | 4 | 4 |
| | BCA-88P-414 | IOT Lab | CC | Practical | 4 | 2 |
| | BCA-88T-415 | Network Security and Cryptography | DSE | Theory | 6 | 6 |
| | BCA-88T-416 | Computer Graphics | CC | Theory | 4 | 4 |
| | BCA-88P-417 | Graphic Design Lab | DSE | Practical | 4 | 2 |
| | | **Total Credits of VIII Sem** | | | 30 | 24 |

| Semester-wise Titles of the Papers in Bachelor of Computer Application (Honours with Research) | | | | | | |
|---|---|---|---|---|---|---|
| Bachelor of Computer Application(Honours with Research) | | | | | | |
| Semester | Course Code | Course Title | Course Type | Theory/ Practical | Teaching Hours/ Week | Credits |
| VII | BCA-87T-421 | Analysis and Design of Algorithms | CC | Theory | 4 | 4 |
| | BCA-87P-422 | ADA Lab | CC | Practical | 4 | 2 |
| | BCA-87T-423 | Android Mobile Application Development | CC | Theory | 4 | 4 |
| | BCA-87P-424 | Mobile Application Development Lab | CC | Practical | 4 | 2 |
| | BCA-87T-425 | Adv. Java Programming | DSE | Theory | 4 | 4 |
| | BCA-87P-426 | Adv. Java Lab | DSE | Practical | 4 | 2 |
| | | Total Credits of VII Sem | | | 24 | 18 |
| VIII | BCA-88T-431 | Big Data Analytics | CC | Theory | 4 | 4 |
| | BCA-88P-432 | Big Data Lab | CC | Practical | 4 | 2 |
| | BCA-88T-433 | IOT | CC | Theory | 4 | 4 |
| | BCA-88P-434 | IOT Lab | CC | Practical | 4 | 2 |
| | BCA-88T-435 | Network Security and Cryptography | DSE | Theory | 6 | 6 |
| | BCA-88P-436 | Research Ethics and Research Methodology | RAEC | Practical | 4 | 2 |
| | | Total Credits of VIII Sem | | | 26 | 20 |
| | BCA-88T-437 | Dissertation/Thesis Preparation & Writing | RAEC | Theory | 12 | 12 |
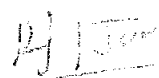
# List of Multidisciplinary Elective Courses(MEC) in Bachelor of Computer Application

| S.No. | Course Code | Course Title | Theory/ Practical | Teaching Hours/ Week | Credits | To be Opted in the Semester |
|-------|-------------|--------------|-------------------|----------------------|---------|------------------------------|
| 1 | BCAMEC1 | C Programming Concepts | Theory | 4 | 4 | III |
| 2 | BCAMEC2 | Web Application Development | Theory | 4 | 4 | III |
| 3 | BCAMEC3 | Fundamentals of Computer | Theory | 4 | 4 | III |
| 4 | BCAMEC4 | Office Management Tools | Theory | 4 | 4 | III |
| 5 | BCAMEC5 | E-Commerce Technologies | Theory | 4 | 4 | IV |
| 6 | BCAMEC6 | Programming in Python | Theory | 4 | 4 | IV |
| 7 | BCAMEC7 | Digital Marketing | Theory | 4 | 4 | IV |
| 8 | BCAMEC8 | Computer Accounting | Theory | 4 | 4 | IV |
| 9 | BCAMEC9 | Multimedia and Animation | Theory | 4 | 4 | V |
| 10 | BCAMEC10 | Introduction to Cyber Security | Theory | 4 | 4 | V |
| 11 | BCAMEC11 | Open Source with PHP | Theory | 4 | 4 | V |
| 12 | BCAMEC12 | Graphic Design | Theory | 4 | 4 | V |

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

# Course Content for BCA, Semesters I and II

## Semester: I

| Corse Code: **BCA-51T-101** | Course Title: **Programming in C** |
|---|---|
| Course Credit : 04 | Hours/Week: 04 |

## Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Confidently operate Desktop Computers to carry out computational tasks
- Understand working of Hardware and Software and the importance of operating systems
- Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given problem
- Perform input and output operations using programs in C
- Write programs that perform operations on arrays Course Content

## BCA-51T-101: Programming in C

### UNIT- I

Basic concepts of Programming languages, Programming Domains, Language Evaluation criteria and language categories, Evolution of major programming languages. Describing syntax and semantics, formal methods of describing syntax, Pseudo code, Design of Algorithm & Flowchart

### UNIT- II

**Fundamentals of C:** History and importance of C, basic structure and execution of C programs, constants, variables, and data types, Various type of declarations, operators types and expressions, evaluation of expressions, operator precedence and associability. Managing input and output operations, decision making and branching.

**Iteration:** while, do…while, for loop, nested loops, break & continue, goto statements.

### UNIT- III

**Array and String:** One-dimensional array and their declaration and initialization, two dimensional arrays and their initializations, character arrays (One and Two dimensional), reading and writing strings, string - handling functions.

**Functions:** Need and elements for user –defined functions, definition of functions, return values and their types, function calls and declaration, recursion, parameter passing, passing arrays and strings to functions, the scope, visibility and life time of variables.

Registrar
(Academic)
University of Rajasthan

# UNIT-IV

**Understanding Pointers:** Accessing the address of a variable, declaration and initialization of pointer variables, accessing a variable through its pointer, pointers and arrays, pointers and function arguments, functions returning pointers.

**Structures and Unions:** Defining structure, declaring structure variable and accessing structure members, initialization of structure, operation on individual members, and array of structures, union, size of structure.

## Recommended Books:

1. Balagurusamy E; Programming in ANSI C;Fifth Edn; Mc Graw Hill,2011.
2. Kanetkar Y.; LET US C; X Edition, BPB,2010.
3. Deitel HM & Deitel JP; C How to program; 5th Edn; Pearson Pub
4. Gottfried B; Programming with C: Schaum Qutlines; Mc Graw Hill Edition.

| Corse Code: **BCA-51P-102** | Course Title: **Programming in C Lab** |
|---|---|
| Course Credit : 02 | Hours/Week: 04 |

Content : **Recommended exercises**

Part A:

1. Program to read radius of a circle and to find area and circumference
2. Program to read three numbers and find the biggest of three
3. Program to demonstrate library functions in math.h
4. Program to check for prime
5. Program to generate n primes
6. Program to read a number, find the sum of the digits, reverse the number and check it for palindrome
7. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
8. Program to read percentage of marks and to display appropriate message (Demonstration of else-if ladder)
9. Program to find the roots of quadratic equation (demonstration of switch Case statement)
10. Program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)
11. Program to remove Duplicate Element in a single dimensional Array
12. Program to perform addition and subtraction of Matrices

Part B:

1. Program to find the length of a string without using built in function
2. Program to demonstrate string functions.
3. Program to demonstrate pointers in C
4. Program to check a number for prime by defining isprime( ) function
5. Program to read, display and to find the trace of a square matrix
6. Program to read, display and add two m x n matrices using functions
7. Program to read, display and multiply two m x n matrices using functions
8. Program to read a string and to find the number of alphabets, digits, vowels, consonants. spaces and special characters.
9. Program to Reverse a String using Pointer

10. Program to Swap Two Numbers using Pointers
11. Program to demonstrate student structure to read & display records of n students.
12. Program to demonstrate the difference between structure & union.

**Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course.**

| Corse Code: BCA-51T-103 | Course Title: **Web Application Development** |
|---|---|
| Course Credit : **04** | Hours/Week: **04** |

## Course Outcomes (COs):
**On completion of the course, the student will be able to:**

1. Understand best technologies for solving web client/server problems
2. Analyze and design real time web applications
3. Use Java script for dynamic effects and to validate form input entry
4. Analyze to Use appropriate client-side and Server-side application technology

## BCA-51T-103 : Web Application Development

### Unit – I

**The Internet** – Basic of internet, file transfer, telnet, usenet, gopher, wais, Archie and veronica. Introduction to Internet Protocols-, HTTP, FTP, SMTP protocols.

**World Wide Web** : Elements of the Web, Web browser and its architecture, The web server, the proxy server, Microsoft internet explorer, viewing pages with a browser, using a browser for Mail, News and chat, Security and Privacy issues (cookies, firewalls, Data Security, executable Applets and scripts, blocking system).

### Unit – II

**HTML Fundamentals:** Introduction to HTML, HTML Elements, HTML Semantics, HTML 5 Doc Types, New Structure Tags, Section, Nav, Article, Aside, Header, Footer, HTML Attributes, Headings, Paragraphs, Styles, Quotations, Blocks, Classes, Layout, Iframes, Creating HTML Pages, incorporating Horizontal Rules and Graphical Elements, Hyper-links, Creating HTML Tables, Creating HTML Forms, HTML and Image Techniques, HTML and Page, Development of Website and Webpage (Planning, Navigation and Themes, Elements of a Web page, steps of creating a site, publishing and publicizing site structuring web site.

### Unit–III

**Cascading Style Sheets:** Understanding Style Sheets, CSS Syntax and Applying Style Sheets to HTML document. Developing Style Sheets: inline, internal and external. CSS Selectors, <DIV> tag. Using class and ID. Styling Backgrounds, Styling borders, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables, Margin. Flex and Grids. **Bootstrap & Web page design** : CMS, Banks of CMS, Joomla/wordpress-Installation. Design and development of websites.

## Unit–IV

**Java script**: Introduction to scripting language, Client Side Scripting, memory concepts, arithmetic decision making. Java script control structures, Java script functions, JS Popup Boxes, events. program modules in java script, function definitions duration of identifiers, scope rules, Controlling Programming Flow, recursion java script global functions. Arrays handling in Java script, The Java Script Object Model, Developing Interactive Forms. Validation of Forms, Cookies and Java Script Security Controlling Frames in Java Script. Client – Side Java Script Custom.

**References :**
1. The Colete eference: HTML & XHTML; Thomas A. Powel, 4th Edn.
2. Mastering HTML 4.0 by Deborah S.Ray an Eric J. Ray From BPB
3. Mastering Java Script, BPB publication.
4. Internet and web technology by Raj Kamal, TMH Publication 2. Steven Holzner.
5. The Complete Reference Java Scripts,, Tata McGraw – Hill,3rd Edn.
6. Java Script, Don Gosselin,Vikas publications

| Corse Code: **BCA-51P-104** | Course Title: **Web Application Development Lab** |
|---|---|
| Course Credit : **02** | Hours/Week: **04** |

## Content : Recommended exercises

**HTML:**
1. Basics  Elements & Attributes,  HTML Formatting tags, Links,
2. Images, Tables, Forms Elements
3. HTML5 Audio and Video, HTML5 Input Types & Attributes
4. CSS Syntax, CSS Attribute Selectors
5. CSS properties:  Fonts, Background, Colors, Links, Lists,
6. CSS Box Model, Display, Opacity, Float, Clear
7. CSS Layout, CSS Navigation Bar,
8. CSS Rounded Corners, CSS Border Images, CSS Animations

**JavaScript:**
1. Displaying Output, DeclaringVariables, Operators, Arithmetic, Data Types,Assignment,
2. JavaScript Functions, Booleans, Comparisons, Conditional ,
3. JavaScript Switch,  Loops, Break, Type,
4. JavaScript Objects, Scope,
5. Strings and String Methods
6. Numbers and Number Methods, Math, JavaScript Dates: Formats and Methods
7. JavaScript Events, JavaScript, JavaScript Forms (API and Validation), Objects,
8. JavaScript Functions, JavaScript DOM, JavaScript Validation, Browser BOM

Dy. Registrar
(Academic)
University of Rajasthan
(Jaipur)

| Corse Code: BCA-51T-105 | Course Title: Computer Fundamentals & Office Management Tools |
|---|---|
| Course Credit : 04 | Hours/Week: 04 |

## Course Outcomes (COs):

- Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers
- Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching
- Introduction to Internet basic, e-mail, Web basics, introduction of HTML and CSS programming .
- Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.
- Office Activities using Word Processor Software
- Office Activities using Spreadsheets Software
- Office Activities using Presentation Software
- Office Activities using Database Software
- Office Activities involving Multimedia Editing (Images, Video, Audio …)
- Operating System Configuration, MS Configuration.

# BCA-51T-105: Computer Fundamentals & Office Management Tools

## UNIT- I

**Introduction to Computers:** Characteristics of computers, Evolution of computers, generation of computers, Block diagram of computer & role of each block, classification of computers. Input and Output Devices

**Primary and Secondary Memory:** Memory hierarchy, Random access memory (RAM), types of RAM, Read only memory (ROM), types of ROM. Classification of secondary storage devices, magnetic tape, magnetic disk, optical disk.

**Number Systems:** Introduction to number system, Binary, Octal, Hexadecimal, conversion between number bases. Arithmetic operations on binary numbers, Alphanumeric- BCD, EBCDIC, ASCII, Unicode.

## UNIT- II

**Computer Software:** software categories, system software, application software, utility software. Classification of system software, **Computer Languages:** Introduction, classification of programming languages, generations of programming languages, features of a good programming language.

**Internet Basics:** Introduction,, Features of Internet, Internet applications, Services of Internet,Logical and Physical addresses, Internet Service Providers, Domain Name System. **Web Basics :** Introduction to Web, Web browsers, http/https,URL.

## UNIT- III

**MS Word:** Word processing, MS-Word features, creating saving and opening documents in Word, interface, toolbars, ruler, menus, keyboard shortcut, editing, previewing, printing & formatting a document, advance features of MS Word, find & replace, using thesaurus, mail merge, handling graphics, tables, converting a Word document into various formats like-text, rich text format, Word perfect, etc.

**MS Excel:** Worksheet basics, creating worksheet, entering data into worksheet, data, text, dates, alphanumeric values saving & quitting worksheet, opening and moving around in an existing worksheet, Toolbars and menus, Keyboard shortcuts, working with single and multiple workbook, working with formula & cell referencing. Auto sum, coping formulas, absolute and relative addressing, formatting of worksheet, previewing & printing worksheet. Graphs and Charts, Database, macros, multiple worksheets-concepts.

## UNIT- IV

**Power Point:** Creating and viewing a presentation, managing Slide Shows, navigating through a presentation, using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with Master Slides, applying and modifying designs, adding graphics, multimedia and special effects.

**Microsoft Access:** Planning a database (tables, queries, forms, reports), creating and editing database, customizing tables, linking tables, designing and using forms, modifying database structure, Sorting and Indexing database, querying a database and generating reports.

### Reference Books:

1. Sanjay Saxena; A First Course in Computers 2003 Edition; Vikas Pub.
2. Computer Fundamentals by P.K. Sinha, BPB Publication.
3. Computer Fundamentals and Programming in C,Reema Thareja,OXFORD University Press.
4. Microsoft; 2007/2010 Microsoft Office System; PHI.
5. Microsoft; Microsoft Office 2007/2010: Plain & Simple; PHI.
6. MS-Office , Dr. S.S. Shrivastava, Published by Laxmi Publication.
7. Office 2019:In Easy Steps,Michal Price ,BPB Publication.

| Corse Code: **BCA-51P-106** | Course Title: **Office Management Tools Lab** |
| --- | --- |
| Course Credit : 02 | Hours/Week: 04 |

## Content: Content : Recommended exercises

Exercises based on Word, Excel, Power Point and Access.

# Course Content for BCA, Semesters II

**Semester: II**

| Corse Code: BCA-52T-111 | Course Title: Operating Systems |
|---|---|
| Course Credit : 04 | Hours/Week: 04 |

## Course Outcomes (COs):

1. Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
2. Analyse important algorithms e.g. Process scheduling and memory management algorithms
3. Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques
4. Demonstrate the ability to perform System Administration tasks in LINUX

## BCA-52T-111 : Operating Systems

### Unit – I

**Concepts:** Operation System & its need, functions of OS, Types of OS : Simple Batch Systems, Multiprogrammed Batched Systems, Time-Sharing Systems, Parallel Systems, Distributed Systems and Real-Time Systems.

**Operating-System Structures:** System Components, Operating System Services, System Calls, System Structure, Virtual Machines.

**Process Management:** Process Concept, Process Scheduling, Operation on Processes.

### Unit – II

**CPU Scheduling Algorithms** : Basic Concepts, Scheduling Criteria, FCFS, SJF, Priority, Round-Robin, Multilevel Queue, Multilevel Feedback Queue, Multiple-Processor Scheduling. Process Synchronization, Critical-Section Problem, Introduction to Semaphores.

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

### Unit-III

**Memory Management:** Background, Logical versus Physical Address space, Swapping, Contiguous allocation (fragmentation), Paging, Segmentation. Virtual Memory, Demand Paging, Page-replacement Algorithms (FIFO, Optimal, LRU, Counting).

**File Management:** File Concepts (Operations & Attributes), Access Methods, Directory Structure, File System Structure, Allocation Methods (Contiguous Allocation, Linked Allocation, Indexed Allocation).

**Device Management:** General device characteristics, device controllers, device drivers. Interrupts Driven I/O. Memory Mapped I/O, Direct Memory.

## Unit-IV

Introduction of different Operating systems (Linux, Unix, Windows Server), Linux: History, design principles, kernel modules, process management, scheduling, memory management, file systems, input and output, inter process communication, network structure, security, Basic essential Linux commands and Shell Scripts.

### Recommended reference books:

1. A. Silbersachatz and P.Galvin, "Operating System Concepts", Addison-Wesley, 5th Ed., 2001.
2. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education. 2000.
3. Tanenbaum A.S., Modern Operating Systems, PHI Publ.
4. Peterson Richard, " The Complete Reference Linux " Tata McGraw Hill.
5. Simitabha Das, "Unix/Linux Concepts & Applications". Tata McGraw Hill
6. Achyut S. Godbole: Operating Systems, Tata Mc-Graw Hill Publishing Company Limited. 2000.
7. Harvey M. Deitel, Operating Systems, Pearson Education, 2001.

| Corse Code: BCA-52P-112 | Course Title: Operating Systems Lab |
|---|---|
| Course Credit : 02 | Hours/Week: 04 |

## Course Outcomes (COs):

1. Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
2. Analyse important algorithms e.g. Process scheduling and memory management algorithms
3. Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques
4. Demonstrate the ability to perform System Administration tasks in LINUX

## Content : Recommended exercises

1. To Installation of Windows.
2. Setings and configurations of OS
3. To learn directory navigation in Linux-like systems.
4. To practice Linux commands
5. Practice pattern matching commands.
6. Practice file editing with vi/nano.
7. Shell script to demonstrate application programs.

| Corse Code: BCA-52T-113 | Course Title: **Data base Management Systems** |
|---|---|
| Course Credit : 04 | Hours/Week: 04 |

## Course Outcomes (COs): On completion of the course, the student will be able to:

1. Understand terms related to database design and management
2. Assess various database models.
3. Evaluate the normality of a logical data model, and correct any anomalies
4. Implement relational databases using MySQL.

# BCA-52T-113 : Data base Management Systems

## UNIT- I

**Database System Concepts & Architecture:** Overview of DBMS, Basic DBMS terminology, data base system v/s file system, Advantages and dis-advantages of DBMS, Coded rules, data independence. Architecture of a DBMS, Schemas, Instances, Database Languages, Database Administrator, Data Models.

## UNIT- II

**Data Modeling:** Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation.

**Relational Model :** Concepts, Constraints, Languages, Relational database design by ER & EER mapping. Relational algebra relational calculus. Relational Algebra, Fundamental operations of Relational Algebra.

## UNIT –III

**Database Design:** Functional dependencies, loss less decomposition, Normalization :    1-NF, 2-NF,3-NF and BCNF.  **Transaction Management :** Transactions:   Concepts, ACID Properties, States Of Transaction. Serializaibility, Isolation, Checkpoints, Deadlock Handling.

**Recovery System & Security :** Failure Classifications, Recovery & Atomicity, Log Base Recovery, Recovery with Concurrent Transactions,  Introduction to Security & Authorization.

## UNIT- IV

**Introduction to SQL:** Characteristics of SQL, Advantages of SQL, SQL data types and literals. Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries. Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.

**Recommended Books:**

Korth H F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill,2010

Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.

Ivan Bayross; SQL/PL 4th Edn: BPB,2009

Navathe S.B. Elmasri R,; Fundamentals of Database Systems, Fifth Edition, Pearson 2011.

Ramakrishan and Gharke, Database Management Systems, 3rd Ed, Tata McGraw Hill, 2007.

Singh S.K.; Database Systems; I Edition; Pearson, 2006.

| Corse Code: BCA-52P-114 | Course Title: DBMS Lab |
|---|---|
| Course Credit : 02 | Hours/Week: 04 |

## Course Contents : Recommended exercises

1. Analyze the organization and identify the entities, attributes and relationships in it.
2. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.
3. Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).
4. Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.
5. Apply the First, Second and Third Normalization levels on the database designed for the organization
6. Installation of Mysql and practicing DDL commands .
7. Creating databases, how to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.
8. Practicing DML commands on the Database created for the example organization
9. DML commands are used to for managing data within schema objects. Some examples: SELECT. INSERT, UPDATE, DELETE
10. Practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS. UNION, INTERSECT, Constraints etc.
11. Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN). GROUP BY, HAVING and Creation and dropping of Views.

| Corse Code: BCA-52T-115 | Course Title: Computer Organization & Architecture |
|---|---|
| Course Credit : 06 | Hours/Week: 06 |

## Course Outcomes (COs): On completion of the course, the student will be able to:

1. Understand Boolean Algebra and Data Representation.
2. Understand and Design of Sequential and Arithmetic Circuits.
3. Boolean Algebra and Data Representation.
4. Understand Microprocessor operations.
5. Remember and Understand the basics of computer architecture, organization and Design.

6. Understand the operations of CPU and I/O devices.
7. Understand the operations and organization of Memory.
8. Understand the concept of parallel processing and pipelining

# BCA-52T-115 : Computer Organization & Architecture

## UNIT- I

**Boolean Algebra and Logic Gates**: Logic Gates, Basic laws of Boolean algebra, Simplification of Boolean algebra.

**Arithmetic Circuits**: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Binary Adder, Parallel binary Subtractor.

**Sequential Logic**: Sequential circuits: Flip-flops, S-R, D, J-K, T, Clocked Flip-flop, Race around condition. Master slave Flip-Flop.

## UNIT-II

**Data Representation**: Number systems-Binary, Octal, Hexadecimal, Complements, Arithmetic operations. floating point representation.

**Register Transfer and Micro Operations**: Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

## UNIT-III

**Basic Computer Organization and Design**: Instruction Codes, Computer Registers; Common bus system, Computer Instructions; Instruction formats; Instruction Cycle; Fetch and Decode, Flowchart for Instruction cycle; Register reference instructions, Addressing Modes.

**CPU Design**: Specifying a CPU, design and implementation of a simple CPU (fetching instructions from memory, decoding and executing instructions, establishing required data paths).

## UNIT-IV

**Input-Output Organization** : Input-output Interfaces, Asynchronous Data Transfer, Mode of Transfer - Programmed I/O, Interrupt I/O, Direct Memory access(DMA).

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. I/O Interrupt, types of Interrupts, Priority Interrupts, Direct Memory Access(DMA).

## Recommended Books
1. M, Morris Mano; Computer System Architectures; III Edition, Prentice Hall of India.2008
2. Andrew S. Tanenbaum , Structured Computer Organization,Printice Hall
3. William Stallings, Computer Organization and Architecture , Sixth Edition, Pearson
4. John D. Carpinelli: Computer Systems Organization & Architecture; 3rd Edition; Person Education Asia,2008
5. Malvino B ; Digital Computer Electronics III Edition; TMHL.