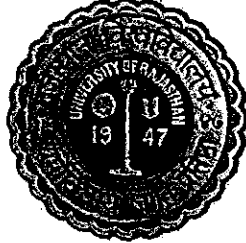# University of Rajasthan

Jaipur

SYLLABUS

(Three/Four Year Under Graduate Programme in B.C.A.)

I & II Semester

Examination-2023-24

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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

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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.

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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

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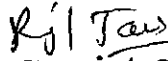(Academic)
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The objectives of the Programme are:

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.

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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.

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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:
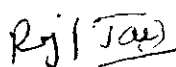
1. Implement standard Software Engineering practices and strategies in real-time software project development
2. Design and develop computer programs/computer based systems in the areas related to AI, algorithms, networking, web design, cloud computing and data analytics.
3. Acquaint with the contemporary 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.

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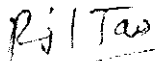University of Rajasthan
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Course Structure for BCA

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

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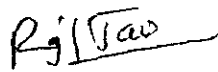
BCA Part - II 2024-25 Onwards

Semester	Course Code	Course Title	Course Type	Theory/ Practical	Teaching Hours/ Week	Credits
Semester-wise Titles of the Papers in Bachelor of Computer Application						
Diploma in Computer Application						
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

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BCA Part - III 2025-26 Onwards

Semester-wise Titles of the Papers in Bachelor of Computer Application						
Bachelor of Computer Application						
Semes ter	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
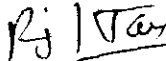
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BCA Part - IV 2026-27 Onwards

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

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BCA Part - IV 2026-27 Onwards

Semester-wise Titles of the Papers in Bachelor of Computer Application (Honours with Research)						
Bachelor of Computer Application(Honours with Research)						
Semes ter	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

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List of Skill Enhancement Courses (SEC) in Bachelor of Computer Application

S.No.	Course Code	Course Title	Theory/ Practical	Teaching Hours/ Week	Credits	To be Opted in the Semester
1	BCASEC1	E-Commerce Technologies	Theory	2	2	I
2	BCASEC2	Digital Marketing	Practical	4	2	II
3	BCASEC3	Communication and Soft Skill	Practical	4	2	III
4	BCASEC4	Cloud Computing	Theory	2	2	IV
5	BCASEC5	Cyber Law and Cyber Security	Theory	2	2	VI

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

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.

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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

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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

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.

Corse Code: BCA-51T-108	Course Title: **E-Commerce Technologies**
Course Credit : 02	Hours/Week: 02

BCA-51T-108: E-Commerce Technologies

Unit-I

Business Environment : Organizational Structure and Design, Dependence on Technology, Integrating Technology with Business Environment, IT and Corporate Strategy, Application of IT in Management Functions.

E-Commerce : Definition, Objectives, Components, Advantages and disadvantages, Scope, E-Commerce Opportunities for Industries, Growth of E-Commerce, e-Commerce Applications- E-Marketing, E-Customer Relationship Management, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing.

Unit-II

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, Government to Citizen, Features and Benefits, Portal V/s Website.

Other Models: Brokerage Model, Aggregator Model, Info-Mediary Model, Community Model and value chain Model.

Unit-III

E-Payments : Introductions, Special features, Types of E-Payment Systems (EFT, E-Cash, E-Cheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets).

Security issues in E-Commerce : Security risk of E-Commerce, Types of threats, Security Tools, Cyber Laws, Business Ethics, EDI Architecture and Standards.

Unit-IV

ERP : Introduction, Needs and Evolution of ERP Systems, ERP Domain, ERP Benefits, ERP and Related Technologies, Relevance to Data Warehousing and Data Mining, ERP Drivers, Evaluation Criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance,.

Recommended Books :

1. Ravi Kalakota, "Electronic Commerce: A Manager's Guide", Addison-Wesley Professional, Edition 2012.
2. Ian Daniel, "E-Commerce get it Right", Neuro Digital Publication, 2011.
3. Dr. K Abirami Devi & Dr. M Alagammai, "E-Commerce Essentials", Margham Publication, 2012.
4. Kenneth C. Laudon, Karol Traver, "E-Commerce 2014", Prentice Hall Publication, 2013.
5. Lexis Leon; Enterprise Resource Planning;TMH
6. Brady, Manu, Wegner; Enterprise Resource Planning; TMH
7. N. K. Venkitakrishnan, Vinod Kumar Garg; Enterprise Resource Planning : Concepts and Practice; PHI Learning.
8. Dimpi Srivastava, Arti batra; ERP Systems; I K International Publishing House

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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).

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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.
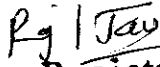7. Harvey M. Deitel, Operating Systems, Pearson Education, 2001.

Corse Code: BCA-52P-112	Course Title: Operating Systems labs
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 Linus commands
5. Practice pattern matching commands.
6. Practice file editing with vi/nano.
7. Shell script to demonstrate application programs.

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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.

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Recommended Books:
1. Korth H F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill,2010
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4th Edn: BPB,2009
4. Navathe S.B. Elmasri R,; Fundamentals of Database Systems, Fifth Edition, Pearson 2011.
5. Ramakrishan and Gharke, Database Management Systems, 3rd Ed, Tata McGraw Hill, 2007.
6. 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.

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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.

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BCA-52P-117 : Digital Marketing

Unit-I

Digital Marketing Fundamentals : Define digital marketing, Importance, Marketing v/s Sales, Marketing Mix and 4 Ps, Digital Marketing, CRM platform, CRM models, CRM platform, Marketing Automation, Inbound vs Outbound Marketing, Content Marketing, Understanding Traffic, Understanding Leads, Strategic Flow for Marketing Activities.

Unit-II

Website Planning and Structure :WWW, Domains, Buying a Domain, Website Language & Technology, Core Objective of Website and Flow, One Page Website, Google Analytics, Tracking Code, Website Auditing.

Search Engine Optimization: Basic Concepts of SEO, Search Engine working, Keywords, titles, meta tags, Understating the SERP, Google processing, Indexing , Crawling,On page optimization techniques, Off page Optimization techniques, Web 2.0 Submission, Article Submission, Image Submission, Video Submission,SEO Audit & Future of SEO.

Unit-III

Email Marketing: Content Writing, Email Machine – The Strategy, Email Frequency, Triggers in Email using 4Ps, Sequence of Email Triggers, Email Software and Tools, Importing Email Lists, Planning Email Campaign, Email Templates and Designs, Sending HTML Email Campaigns, WebForms Lead Importing, Integrating Landing Page Forms Campaign Reports and Insights, Segmentation Strategy Segmentation, Lists Auto-Responder Series Triggering Auto – Responder Emails

Google Adwords : Basics, Google Ad Types, Pricing Models, PPC Cost Formula, Ad Page Rank, Billing and Payments, Adwords User Interface, Keyword Planning, Keywords Control, Creating Ad Campaigns, Creating Text Ads, Creating Ad Groups, Bidding Strategy for CPC.

Unit-IV

Social Media Optimization (SMO) : Introduction Social Media Optimization, Introduction to Social Media networks, Types of Social media Websites, Social Media Optimization Concept, Facebook, Google+, LinkedIn, YouTube, Pinterest, Hashtags, image optimization

Social Media Marketing (SMM) :Facebook Optimization, Fan Page Vs profile Vs Group, Creating Facebook page for Business, Increasing fans and Doing Marketing, Facebook Analytics, Facebook Advertising and Its types, Creating Advertising Campaigns, Payment modes, Introduction to Twitter, Creating Strong profiles on twitter.

Recommended Books:

Ian Dodson, "The Art of Digital Marketing ", Wiley, 2018
Seema Gupta, "Digital Marketing" Mc-Graw Hill, 1st Edition, 2017
References: Puneet Singh Bhatia, "Fundamentals of Digital Marketing", Pearson, 1st Edition, 2017
Vandana Ahuja, "Digital Marketing", Oxford University Press
Philip Kotler, "Marketing 4.0: – Moving from Traditional to Digital", Wiley, 2017