MAHARAJA SURAJMAL BRIJ UNIVERSITY BHARATPUR

NATIONAL EDUCATION POLICY-2020

STRUCTURE OF UG-BACHELOR OF COMPUTER APPLICATION (BCA)

Syllabus for I & II Semesters

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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

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creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

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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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.

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.

Course Structure for BCA

BCA Part - I (I & II Semester)

Semester	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-40T-101	Programming in C	CC(Major)	Theory	4	4
	BCA-40P-102	Programming in C Lab	CC(Major)	Practical	4	2
	BCA-40T-103	Web Application Development	CC(Major)	Theory	4	4
	BCA-40P-104	Web Application Development Lab	CC(Major)	Practical	4	2
	BCA 40T-105	Computer Fundamentals& Office Management Tools	CC(Major/ Minor)	Theory	4	4
	BCA 40P-106	Office Management Tools Lab	CC(Major/ Minor)	Practical	4	2
		AEC-I	AEC	Theory	4	4
		SEC-I	SEC	Theory/ Practical		2
		VAC-I	VAC	Theory/ Practical		2
		Total				26
II	BCA 40T-201	Operating Systems	CC(Major)	Theory	4	4
	BCA 40P-202	Operating Systems Lab	CC(Major)	Practical	4	2
	BCA-40T-203	Database Management Systems	CC(Major)	Theory	4	4
	BCA 40P-204	DBMS Lab	CC(Major)	Practical	4	2
	BCA 40T-205	Computer Organization & Architecture	CC(Major/ Minor)	Theory	6	6
		AEC-II	AEC	Theory	4	4
		SEC-II	SEC	Theory/ Practical		2
		VAC-II	VAC	Theory/ Practical		2
		Total				26

Course Content for BCA Semester I and II

Course Code: BCA-40T-101	Course Title: **Programming in C**
Course Credit : 04	Hours/Week: 04

Course Objectives (COs):

Upon successful completion of this course, students will be able to learn:

- To Understand the basic language implementation techniques
- Develop ability to learn new languages more quickly
- To understand the concept of functional programming language
- Develop ability to learn and write small programs in different programming Languages

Course Outcomes (COs):

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

- Understand the basic programming concepts and syntax of the C language.
- Design and implement algorithms to solve simple programming problems.
- 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
- Write, compile, and execute C programs using integrated development environments (IDEs).

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.

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;FifthEdn; Mc Graw Hill,2011.
2. KanetkarY.; LET US C; X Edition, BPB,2010.
3. Deitel HM & Deitel JP; C How to program; 5thEdn; Pearson Pub
4. GottfriedB; Programming with C: SchaumQutlines; Mc Graw Hill Edition.

Course Code: BCA-40P-102	Course Title: **Programming in C Lab**
Course Credit : 02	Hours/Week: 04

Content: Suggested Experiments

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 add two m x n matrices using functions
6. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
7. Program to Reverse a String using Pointer
8. Program to Swap Two Numbers using Pointers
9. Program to demonstrate student structure to read & display records of n students.
10. Program to demonstrate the difference between structure & union.

Note: **Student can execute a minimum of 10 programs from part A & 8 programs from part B to complete the Lab course.**

Course Code: BCA-40T-103	Course Title: **Web Application Development**
Course Credit : 04	Hours/Week: 04

Course Objectives (COs):

By the end of this course, students will be able to:

- Comprehend the optimal technologies for addressing web client/server challenges.

- Evaluate and create real-time web applications.

- Utilize JavaScript for dynamic effects and form input validation.

- Analyze and select suitable client-side and server-side application technologies.

Course Outcomes (COs):

On completion of the course, the student will be able to:

- Understand best technologies for solving web client/server problems

- Analyze and design real time web applications
- Use Java script for dynamic effects and to validate form input entry
- Analyze to Use appropriate client-side and Server-side application technology

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; ThomasA.Powel, 4[th]Edn.

2. Mastering HTML 4.0 by DeborahS.Ray an EricJ.Ray From BPB

3. Mastering Java Script, BPB publication.

4. Internet and web technology by Raj Kamal, TMH Publication 2. StevenHolzner,

5. The Complete Reference Java Scripts,, TataMcGraw – Hill,3rdEdn.

6. Java Script, DonGosselin,Vikas publications

Course Code: BCA-40P-104	Course Title: **Web Application Development Lab**
Course Credit : **02**	Hours/Week: **04**

Content: Suggested Experiments HTML:

1. Define the basic Structure of HTML.
2. Write a program to demonstrate various tags in HTML.
3. Implement the Heading Element in HTML.
4. Write a program to insert image in HTML.
5. Write a program to implement Formatting text in HTML.
6. Write a program for changing Background and Style.
7. Write a program to create a Table in HTML.
8. Write a program to implement Lists in HTML.
9. Write a program to implement Frameset in HTML.
10. Write a program to Create Form in HTML
11. Write a program to implement Inline, Internal and External CSS.
12. Write a JavaScript program to validate USER LOGIN page.
13. Write a JavaScript program for validating REGISTRATION FORM

Course Code: BCA-40-T-105	Course Title: **Computer Fundamentals & Office Management Tools**
Course Credit : 04	Hours/Week: 04

Course Objectives (COs):

By the end of this course, students will be able to:

- Understand Fundamental Computing Concepts and gain a solid foundation in the basic principles of computer science, including hardware, software, and networking.
- Develop Proficiency in Office Management Tools such as word processors, spreadsheets, presentation tools, and database management systems.

- Apply Information Technology in Business Contexts to Understand how information technology can be applied to solve business problems and improve organizational efficiency.

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
- 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.

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 MasterSlides, 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. SanjaySaxena; A First Course in Computers 2003 Edition; VikasPub.

2. Computer Fundamentals by P.K.Sinha, BPB Publication.

3. Computer Fundamentals and Programming in C,ReemaThareja,OXFORDUniversity 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,MichalPrice ,BPB Publication.

Course Code: BCA-4OP-106	Course Title: **Office Management Tools Lab**
Course Credit : 02	Hours/Week: 04

Content: Suggested Experiments

1. What is illustration in MS Word? Prepare document with inserting following
   a. Pictures
   b. Clip Art
   c. Screenshot
2. Create a flowchart using,
   a. Proper shapes like ellipse, arrows, rectangle, and parallelogram.
   b. Use grouping to group all the parts of the flowchart into one single object.
3. Create table as below and shading the first row. Insert an Octagon and write your name in the center.

Day	Period I	Period II	Period III	Period IV
Monday	Hindi	Maths	Sanskrit	Hindi
Tuesday	Maths	Hindi	Urdu	Science
Wednesday	Science	Computer	Computer	Computer
Friday	Computer	Science	Science	English
Saturday	English	Sanskrit	Hindi	Maths

i. Create margin at the top & bottom 1.1 inch and right & left 1.5 inch
ii. Create landscape orientation & A4 paper size
iii. Insert Period III column after Period II
iv. Insert Thursday row bellow Wednesday row
v. Insert page number center align and Arial font
vi. Insert watermark "Hello world"
vii. Table font "Times new roman" and 13 size

4. Create a letter, which must be sent to multiple recipients.
   a. Use Mail-Merge to create the recipient list.
   b. Use excel sheet to enter the recipient.
   c. Start the mail merge using letter and directory format. State the difference.
5. Create and Editing Worksheets by using Excel
6. Creating Excel Sheets with Formula and Functions
7. Sorting and Querying Data
8. Monthly Expenses Report using Excel
9. Calculation of Ratios using basic functions in Excel – Average, Count, Minimum
10. Use of Sum, Sumif, Count and Count if functions
11. Create a power-point presentation with minimum 5 slides.
    a. The first slide must contain the topic of the presentation and name of the presentation.
    b. Must contain at least one table.
    c. Must contain at least 5 bullets, 5 numbers.
    d. The heading must be, font size:32, font-face: Arial Rounded MT Bold, font-color: blue.
    e. The body must be, font size: 24, font-face: Comic Sans MS, font-color: green.
    f. Last slide must contain ,,thank you".
12. Create a power-point presentation with minimum 5 slides
    a. Use custom animation option to animate the text; the text must move left to right one line at a time.
    b. Use proper transition for the slides.
13. Create a database "Student" with,
    a. At least one table named "mark sheet" with field name "student name, roll number, mark1, mark2, mark3, mark4, total"
    b. The data types are, student name: text, roll number: number, mark1 to mark4: number, total: number. Roll number must be the primary key.
    c. Enter data in the table. The total must be calculated using update query.
    d. Use query for sorting the table according to the descending/ascending order of the total marks.
14. with addition to the table above,
    a. Add an additional field "result" to the "mark sheet" table.
    b. Enter data for at least 10 students
    c. Calculate the result for all the students using update queries, if total>=200, then pass, else fail.
    d. Search the students, whose name starts with "sh".
    e. Show the names and total marks of the students who have passed the examination.

Course Content for BCA Semester II

Semester: II

Course Code: BCA-40-T-201	Course Title: **Operating Systems**
Course Credit : **04**	Hours/Week: **04**

Course Objectives (COs):

Upon finishing the course, students will be able to:

- To design and understand the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems.
- To evaluate, and compare OS components through instrumentation for performance analysis.
- To analyze the various device and resource management techniques for timesharing and distributed systems
- To develop and analyze simple concurrent programs using transactional memory and message passing, and to understand the trade-offs and implementation decisions

Course Outcomes (COs):

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

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, Operations 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 & Deadlocks: The Critical section problem, synchronization hardware semaphores, Classical problems of synchronization, Critical regions, 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 to Linux , Evolution of Linux, Linux Architecture, Linux file system (inode, Super block, Mounting and Unmounting), Essential Linux Commands and Shell Scripts (Internal and External Commands), Kernel, Process Management in Linux.

Recommended reference books:

1. A.Silbersachatz and P.Galvin, "Operating System Concepts", Addison-Wesley, 5th Ed., 2001.

2. GaryNutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education, 2000.

3. Tanenbaum A.S., Modern Operating Systems, PHI Publ.

4. PetersonRichard, " The Complete Reference Linux " Tata McGraw Hill.

5. SimitabhaDas, "Unix/Linux Concepts & Applications". Tata McGraw Hill

6. AchyutS.Godbole: Operating Systems, Tata Mc-Graw Hill Publishing Company Limited, 2000.

7. HarveyM.Deitel, Operating Systems, Pearson Education, 2001

Course Code: BCA-40P-202	Course Title: **Operating Systems Lab**
Course Credit : **02**	Hours/Week: **04**

Course Outcomes (COs):

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

Content : Suggested Experiments

1. Implementation of CPU Scheduling.

   (i) FCFS (ii) SJF (iii) Shortest Remaining Time First (IV) Round Robin

2. Producer-Consumer Problem using Semaphores and Reader Writer Problem

3. Simulate algorithm for deadlock prevention and detection

4. Simulate memory allocation methods: (i) Best Fit, (ii) Worst Fit and (iii) Next Fit

5. Simulate page replacement algorithms: FIFO, LRU and Optimal

6. Implementation of Disk Scheduling using SSTF, LOOK and C-LOOK algorithm

7. To practice Linux commands

8. Basics of UNIX commands and Implementation of Shell Programming

Course Code: BCA-40T-203	Course Title: **Database Management Systems**
Course Credit : 04	Hours/Week: 04

Course Objectives (COs):

Upon finishing the course, students will be able to:

- Upon finishing the course, students will be able to:
- To study types of MySQL databases (Document oriented, keyValue pairs, Column-oriented and Graph)

- To understand detailed architecture, define objects, load data, query data and performance tune MySQL databases.
- Able to handle large volume of data through queries.

Course Outcomes (COs): On completion of the course, the student will be able to:
- Understand terms related to database design and management
- Assess various database models.
- Evaluate the normality of a logical data model, and correct any anomalies
- Implement relational databases using MySQL.

Database 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:

1. KorthHF and SilberschatazA, System Concepts, Sixth Edition; McGraw Hill,2010

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

3. IvanBayross; SQL/PL 4thEdn: BPB,2009

4. NavatheS.B.ElmasriR,; Fundamentals of Database Systems, Fifth Edition, Pearson 2011.

5. Ramakrishan and Gharke, Database Management Systems, 3rdEd, Tata McGraw Hill, 2007.

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

Course Code: BeA-40P-204	Course Title: **DBMS Lab**
Course Credit : 02	Hours/Week: 04

Course Contents: **Suggested Experiments**

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. 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.

Course Code: BCA - 40T-205	Course Title: **Computer Organization & Architecture**
Course Credit : 06	Hours/Week: 06

Course Objectives (COs):

Upon finishing the course, students will be able to:

- The students will be able to understand digital logic design, including logic elements, and their use in combinational and sequential logic circuit design, the basic architecture of processing, memory and I/O organization in a computer system.
- Understand the design of Sequential and Arithmetic Circuits.
- Understand the functions of CPU and I/O devices.
- Understand the operations and structure of Memory.

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

- Understand Boolean Algebra and Data Representation.
- Understand and Design of Sequential and Arithmetic Circuits.
- Boolean Algebra and Data Representation.
- Understand Microprocessor operations.
- Remember and Understand the basics of computer architecture, organization and Design.
- Understand the operations of CPU and I/O devices.
- Understand the operations and organization of Memory.
- Understand the concept of parallel processing and pipelining

Computer Organization & Architecture

UNIT- I

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

Combinatorial Logic : Multiplexers, Decoders, Encoders, Adder & Subtractor, Parallel Binary Adder, Parallel binary Subtractor .

Data Representation: Number System, Arithmetic operations, complements, floating point representation

UNIT-II

Sequential Logic: Sequential circuits: Flip-flops, S-R, D, J-K, T, Clocked Flip-flop, Race around

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condition, Master slave Flip-Flop.

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, MorrisMano; Computer System Architectures; III Edition, Prentice Hall of India,2008

2. AndrewS.Tanenbaum , Structured Computer Organization,Printice Hall

3. WilliamStallings, Computer Organization and Architecture , Sixth Edition, Pearson

4. JohnD.Carpinelli: Computer Systems Organization & Architecture; 3rd Edition; Person Education Asia,2008

5. MalvinoB ; Digital Computer Electronics III Edition; TMHL.

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