



NEP-2020

CURRICULUM STRUCTURE AND SYLLABUS

**Bachelor of Computer Applications (Basic and Honors) Programmes
as Major and Minor Courses**

**And
Open Elective courses in Computer Applications**

UG BOS IN COMPUTER SCIENCE

w.e.f Academic Year 2022-23 onwards

The objectives of the BCA Program

1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software
2. It helps students analyze the requirements for system development and exposes students to business software and information systems
3. This course provides students with options to specialize in legacy application software, system software or mobile applications
4. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
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 prepare students who wish to go on to further studies in computer science and related subjects.
8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

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. 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.
4. Programming a computer: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.
5. Application Systems Knowledge: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
6. 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.
7. Communication: Must have a reasonably good communication knowledge both in oral and writing.
8. Project Management: Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
9. 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.
10. Lifelong Learning: Should become an independent learner. So, learn to learn ability.
11. Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

Additional Program Outcomes: BCA Degree (Hons)

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. Apply 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, IoT and data analytics.
3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
4. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
5. The ability to work independently on a substantial software project and as an effective team member.

Curriculum for BCA

Sem	Core Courses	Hour / Week		DS Elective Courses	Hous/ Week
		Theory	Lab		
1	i. Fundamentals of Computers	3			
	ii. Programming in C	3			
	iii. Mathematical Foundation	3			
	iv. LAB: Information Technology		4		
	v. LAB: C Programming		4		
2	i. Discrete Mathematical Structures	3			
	ii. Data Structures using C	3			
	iii. Object Oriented Concepts using JAVA	3	4		
	iv. LAB: Data Structure		4		
	v. LAB: JAVA Lab				
3	i. Data Base Management Systems	3			
	ii. C# and DOT NET Framework	3			
	iii. Computer Communication and Networks	3			
	iv. LAB: DBMS		4		
	v. LAB: C# and DOT NET Framework		4		
4	i. Python Programming	3			
	ii. Computer Multimedia and Animation	3			
	iii. Operating Systems Concepts	3	4		
	iv. LAB: Multimedia and Animation		4		
	v. LAB: Python programming				
5	i. Internet Technologies	3		(a) Cyber Law and CyberSecurity	3
	ii. Statistical Computing and R Programming	3		(b) Cloud Computing	3
	iii. Software Engineering	3		(c) Business Intelligence	3
	iv. LAB: R Programming		4		
	v. LAB: JAVA Script, HTML and CSS		4		
	vi. Vocational 1	3			
6	i. Artificial Intelligence and Applications	3		(a) Fundamentals of DataScience	3
	ii. PHP and MySQL	3	4	(b) Mobile Application Development	3
	iii. LAB: PHP and MySQL		12	(c) Embedded Systems	3
	iv. PROJECT:	3			
	v. Vocational 2				
7	i. Analysis and Design of Algorithms	3		(a) Data Compression	3
	ii. Data Mining and Knowledge Management	3		(b) IoT	3
	iii. LAB: Algorithms		4	(c) Data Analytics	3
	iv. LAB: Data Mining and Knowledge Management		4		
	v. Vocational 3				
8	i. Automata Theory and Compiler Design	3		(a) Open-Source Programming	3
	ii. Cryptography and Network Security	3	4	(b) Storage Area Networks	3
	iii. Compiler Lab		12	(c) Pattern Recognition	3
	iv. LAB: Project	3		(a) Machine Learning	
	v. Vocational 4				

TABLE I: COURSE STRUCTURE FOR BCA.

Semester	Course Code	Title of the Paper	Credit	Total Credit of OE, Languages, CAE, Voc, AECC, SEC	Total Credit
I	CAC01	Fundamentals of Computers	3	13	26
	CAC02	Programming in C	3		
	CAC03(a)/(b)	Mathematical Foundation	3		
	CAC01P	LAB: Information Technology	2		
	CAC02P	LAB: C Programming	2		
II	CAC04	Data Structures using C	3	13	26
	CAC05	Object Oriented Concepts using JAVA	3		
	CAC06	Discrete Mathematical Structures	3		
	CAC04 P	LAB: Data Structure	2		
	CAC05 P	LAB: JAVA	2		
III	CAC07	Data Base Management Systems	3	13	26
	CAC08	C# and DOT NET Framework	3		
	CAC09	Computer Communication and Networks	3		
	CAC07P	LAB: DBMS	2		
	CAC08P	LAB: C# and DOT NET Framework	2		
IV	CAC10	Python Programming	3	13	26
	CAC11	Computer Multimedia and Animation	3		
	CAC12	Operating System Concepts	3		
	CAC10P	LAB: Python programming	2		
	CAC11P	LAB: Multimedia and Animation	2		
V	CAC13	Internet Technologies	3	10	23
	CAC14	Statistical Computing and R Programming	3		
	CAC15	Software Engineering	3		
	CAC13P	LAB: JAVA Script, HTML and CSS	2		
	CAC14P	LAB: R Programming	2		
VI	CAC16	PHP and MySQL	3	10	23
	CAC17	Artificial Intelligence and Applications	3		
	CAC16P	LAB: PHP and MySQL	2		
	CA-P1	Project Work	5		
VII	CAC18	Analysis and Design of Algorithms	3	11	21
	CAC19	Data Mining and Knowledge Management	3		
	CAC18P	LAB: Algorithms	2		
	CAC19P	LAB: Data Mining	2		
	CAI01	Internship	2		
VIII	CAC20	Automata Theory and Compiler Design	3	6	20
	CAC21	Cryptography and Network Security	3		
	CAC20P	LAB: Compiler Lab	2		
	CAP02	Project Work	6		

TABLE II: CS COURSE DETAILS FOR BCA

Course-Type	Course Code as referred above	Compulsory/ Elective	List of compulsory courses and list of option of elective courses. (A suggestive list)
CA	CAC01, CAC02, CAC03(a)/(b), CAC04, CAC05, CAC06, CAC07, CAC08, CAC09, CAC10, CAC11, CAC12, CAC13, CAC14, CAC15, CAC16, CAC17, CAC18, CAC19, CAC20, CAC21	Compulsory	As Mentioned in Table I
CA E	CAE-1A	Elective	Cyber Law and Cyber Security OR Business Intelligence OR Fundamentals of Data Science
	CAE-2A	Elective	Fundamentals of Data Science OR Mobile Application Development OR Embedded Systems
	CAE-3A	Elective	Data Compression OR Internet of Things (IoT) OR Data Analytics
	CAE-4A	Elective	Open-source Programming OR Storage Area Networks OR Pattern Recognition OR Machine Learning
Vocational	Vocational -1	Elective	DTP, CAD and Multimedia OR Hardware and Server Maintenance OR Web Content Management Systems OR Computer Networking OR Health Care Technologies OR Digital Marketing OR Office Automation
	Vocational -2	Elective	
	Vocational -3	Elective	
	Vocational -4	Elective	
SEC	SEC 1	Compulsory	Health & Wellness/ Social & Emotional Learning
	SEC 2	Compulsory	Sports/NCC/NSS etc
	SEC 3	Compulsory	Ethics & Self Awareness
	SEC 4	Compulsory	Professional Communication
AECC	AECC1	Compulsory	Environmental Studies
	AECC2	Compulsory	Constitution of India
Language 1	L1-1, L1-2, L1-3, L1-4	Compulsory	Kannada/Functional Kannada
Language 2	L2-1, L2-2, L2-3, L4-4	Elective	English/Hindi/French/ Additional English/ etc.

Computer Application Core Courses (CA C) for BCA (Hons)

Sl. No	Course Code	Title of the Paper
1	CAC01	Fundamentals of Computers
2	CAC02	Programming in C
3	CAC03	Mathematical Foundation
4	CAC04	Discrete Mathematical Structures
5	CAC05	Object Oriented Concepts using JAVA
6	CAC06	Data Structures using C
7	CAC07	Data Base Management Systems
8	CAC08	C# and DOT NET Framework
9	CAC09	Computer Communication and Networks
10	CAC10	Python Programming
11	CAC11	Computer Multimedia and Animation
12	CAC12	Operating System Concepts
13	CAC13	Internet Technologies
14	CAC14	Statistical Computing and R Programming
15	CAC15	Software Engineering
16	CAC16	PHP and MySQL
17	CAC17	Artificial Intelligence and Applications
18	CAC18	Analysis and Design of Algorithms
19	CAC19	Data Mining and Knowledge Management
20	CAC20	Automata Theory and Compiler Design
21	CAC21	Cryptography and Network Security

Computer Application Electives (CA E) for BCA (Hons)

Sl. No	Computer Application Electives (CA E)
1	Business Intelligence
02	Cyber Law and Cyber Security
3	Data Analytics
4	Data Compression
5	Embedded Systems
6	Fundamentals of Data Science
7	Internet of Things (IoT)
8	Machine Learning
9	Mobile Application Development
10	Open-source Programming
11	Pattern Recognition
12	Storage Area Networks

Vocational Electives

Sl. No	Vocational Electives
1	DTP, CAD and Multimedia
2	Hardware and Server Maintenance
3	Web Content Management Systems
4	Computer Networking
5	Health Care Technologies
6	Digital Marketing
7	Office Automation

Open Electives in Computer Science

Sl. No.	Semester	Open Electives
01	FIRST SEMESTER	<u>Any one from the following</u> <ul style="list-style-type: none">• Office Automation• Computer Fundamentals• Problem Solving and C Programming Concepts
02	SECOND SEMESTER	<u>Any one from the following excluding elective chosen in the first semester</u> <ul style="list-style-type: none">• Office Automation• Computer Fundamentals• Problem Solving and C Programming Concepts
03	THIRD SEMESTER	<u>Any one from the following</u> <ul style="list-style-type: none">• Web Designing• E-Commerce
04	FOURTH SEMESTER	<u>Any one from the following excluding elective chosen in the third semester</u> <ul style="list-style-type: none">• Web Designing• E-Commerce

Syllabus for BCA (Basic and Honors)

Semester: I

Course Code: CAC01	Course Title: Fundamentals of Computers
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

Course Outcomes (COs):

- Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers
- Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting
- Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not in
- Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching
- Web Programming basics, introduction of HTML and CSS programming
- Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.

Course Content

Content	Hours
Unit - 1	
Fundamentals of Computers: Introduction to Computers - Computer Definition, Evolution and History of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples (at least 5 hours of teaching).	10

Unit-2	
<p>Introduction to Computer: Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Super computers.</p> <p>Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Storage units, Input and output Devices. How CPU and memory works. Program execution with illustrative examples. Introduction to microcontrollers.</p>	10
Unit-3	
<p>Operating System Fundamentals: Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Microkernel Based Operating System, Booting.</p>	08
Unit-4	
<p>Introduction to Database Management Systems: Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL with constraints, DML, DCL, TCL</p>	08
Unit-5	
<p>Internet Basics: Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System.</p> <p>Web Basics: Introduction to web, web browsers, http/https, URL, HTML5, CSS</p>	06

Text Books:

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication
2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,

Reference:

1. J. Glenn Brook shear," Computer Science: An Overview", Addison-Wesley, Twelfth Edition,
2. R.G. Dromey, "How to solve it by Computer", PHI,

Course Code: CAC01P	Course Title: Information Technology Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 04

Part A:

1. Activities using Word Processor Software
2. Activities using Spreadsheets Software
3. Activities using Presentation Software
4. Activities involving Multimedia Editing (Images, Video, Audio ...)
5. Tasks involving Internet Browsing

Part B:

1. Flow charts: Installation and using of flowgarithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), decision making and looping, arrays and recursion (at least 10 problems covering all concepts).

NOTE: In addition to the ones listed above, colleges can include other activities so as for the student to become proficient in using personal computers for multiple purposes for which modern computers can be put to use.

Reference:

1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K.A CRC press, 2014
2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer

Web References:

<http://www.flowgorithm.org/documentation/>

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Code: CAC02	Course Title: Programming in C
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

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

Content	Hours
Unit - 1	
Introduction to C Programming: Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants.	5
Unit-2	
Input and output with C: Formatted I/O functions - <i>printf</i> and <i>scanf</i> , control strings and escape sequences, output specifications with <i>printf</i> functions; Unformatted I/O functions to read and display single character and a string - <i>getchar</i> , <i>putchar</i> , <i>gets</i> and <i>puts</i> functions.	4
Unit-3	
C Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associativity; Evaluation of arithmetic expressions; Type conversion.	11

Control Structures: Decision making Statements - <i>Simple if, if_else, nested if_else, else_if ladder, Switch Case, goto, break & continue</i> statements; Looping Statements - Entry controlled and exit controlled statements, <i>while, do-while, for</i> loops, Nested loops.	
Unit - 4	
<p>Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation.</p> <p>Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers;</p>	12
Unit-5	
<p>User Defined Functions: Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type.</p> <p>User defined data types: Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.</p>	10

Text Books:

1. C: The Complete Reference, By Herbert Schildt.
2. M.T Somashekara, D.S Guru and K.S. Manjunatha: Problem solving with C, PHI publication
3. C Programming Language, By Brain W. Kernighan
4. Kernighan & Ritchie: The C Programming Language (PHI)

Reference Books:

1. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB)
2. E. Balaguruswamy: Programming in ANSI C (TMH)
3. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
4. V. Rajaraman: Programming in C (PHI – EEE)
5. S. Byron Gottfried: Programming with C (TMH)
6. Yashwant Kanitkar: Let us C
7. P.B. Kottur: Programming in C (Sapna Book House).

Course Code: CAC02P	Course Title: C Programming Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks:10
Exam Marks: 40	Exam Duration: 04

Part A:

1. Write a C Program to read radius and find area and volume of a sphere.
2. Write a C Program to read three numbers and find the biggest of three
3. Write a C Program to demonstrate library functions in *math.h* (at least 5)
4. Write a C Program to read a number, find the sum of the digits, reverse the number and check it for palindrome
5. Write a C Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
6. Write a C Program to read percentage of marks and to display appropriate grade (using switch case)
7. Write a C Program to find the roots of quadratic equation (if else ladder)
8. Write a C program to read marks scored in 3 subjects by n students and find the average of marks and result (Demonstration of single dimensional array)
9. Write a C Program to remove Duplicate Element in a single dimensional Array
10. Program to perform addition and subtraction of Matrices

Part B:

1. Write a C Program to find the length of a string without using built in function
2. Write a C Program to demonstrate string functions (at least 3).
3. Write a C Program to demonstrate pointers in C
4. Write a C Program to generate n prime number by defining *isprime ()* function
5. Write a C Program to find the trace of a square matrix using function
6. Write a C Program to read, display and multiply two matrices using functions
7. Write a C Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
8. Write a C Program to Reverse a String using Pointer
9. Write a C Program to demonstrate student structure to read & display records of n students.
10. Write a C Program to demonstrate the difference between structure & union.

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Code: CAC03	Course Title: Mathematical Foundation
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

Course Outcomes (COs):

- Study and solve problems related to connectives, predicates and quantifiers under different situations.
- Develop basic knowledge of matrices and to solve equations using Cramer's rule.
- Know the concept of Eigen values.
- To develop the knowledge about derivatives and know various applications of differentiation.
- Understand the basic concepts of Mathematical reasoning, set and functions

Content	Hours
Unit - 1	
Mathematical logic: Mathematical logic introduction-statements Connectives- negation, conjunction, disjunction- statement formulas and truth tables- conditional and bi Conditional statements- tautology contradiction- equivalence of formulas-duality law-Predicates and Quantifiers, Arguments.	10
Unit - 2	
sets and Functions: power set- Venn diagram Cartesian product-relations - functions- types of functions - composition of functions.	10
Unit - 3	
Matrices and determinant: Introduction-Types of matrices-matrix operations-transpose of a matrix -determinant of matrix - inverse of a matrix- Cramer's rule	10
Unit - 4	
Matrix algebra: finding rank of a matrix – normal form-echelon form Cayley Hamilton theorem-Eigen values.	06
Unit -5	
Differential calculus: Functions and limits - Simple Differentiation of Algebraic Functions – Evaluation of First and Second Order Derivatives – Maxima and Minima	06

Text Books:

P. R. Vittal-Business Mathematics and Statistics, Margham Publications, Chennai,

Reference Books:

B. S. Vatsa-Discrete Mathematics –New Age International Limited Publishers, NewDelhi

Semester: II

Course Code: CAC04	Course Title: Data Structures using C
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

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

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
- Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs
- Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
- Demonstrate different methods for traversing trees
- Compare alternative implementations of data structures with respect to performance
- Describe the concept of recursion, give examples of its use
- Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

Content	Hours
Unit - 1	
Introduction to data structures: Definition; Types of data structures - Primitive & Non-primitive, Linear and Non-linear; Operations on data structures. Algorithm Specification, Performance Analysis, Performance Measurement Recursion: Definition; Types of recursions; Recursion Examples - Fibonacci numbers, GCD, Binomial coefficient nCr , Towers of Hanoi; Comparison between iterative and recursive functions.	08
Unit - 2	
Arrays: Basic Concepts – Definition, Declaration, Initialization, Operations on arrays; Types of arrays; Arrays as abstract data types (ADT); Representation of Linear Arrays in memory; Traversing linear arrays; Inserting and deleting elements; Sorting – Selection sort, Bubble sort, Quick sort, Insertion sort, merge sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching; Multidimensional arrays; Representation of multidimensional arrays; Sparse matrices.	12

Unit - 3	
Stacks: Basic Concepts – Definition and Representation of stacks; Operations on stacks; Applications of stacks; Infix, postfix and prefix notations; Conversion from infix to postfix using stack; Evaluation of postfix expression using stack; Application of stack in function calls. Queues: Basic Concepts – Definition and Representation of queues; Types of queues – Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues;	10
Unit-4	
Dynamic memory allocation: Static & Dynamic memory allocation; Memory allocation and de- allocation functions - malloc, calloc, realloc and free. Linked list: Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, Doubly linked list, Header linked list, Circular linked list; Representation of Linked list in Memory; Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion; Memory allocation; Garbage collection.	12
Unit-5	
Trees: Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth; Binary tree: Type of binary trees - strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; preorder, inorder and postorder traversal; Reconstruction of a binary tree when any two of the traversals are given.	10

Text Books

1. Ellis Horowitz and Sartaj Sahni: Fundamentals of Data Structures

References

1. Tanenbaum: Data structures using C (Pearson Education)
2. Kamathane: Introduction to Data structures (Pearson Education)
3. Y. Kanitkar: Data Structures Using C (BPB)
4. Kottur: Data Structure Using C
5. Padma Reddy: Data Structure Using C
6. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGraw Hill Education, 2007))

Course Code: CAC04P	Course Title: Data Structure Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 03 Hours

Programming Lab

Part A:

1. Write a C Program to find GCD using recursive function
2. Write a C Program to display Pascal Triangle using binomial function
3. Write a C Program to generate n Fibonacci numbers using recursive function.
4. Write a C Program to implement Towers of Hanoi.
5. Write a C Program to implement dynamic array, find smallest and largest element of the array.
6. Write a C Program to read the names of cities and arrange them alphabetically using bubble sort.
7. Write a C Program to sort the given list using selection sort technique.
8. Write a C Program to sort the given list using insertion sort technique.

Part B:

1. Write a C Program to sort the given list using quick sort technique.
2. Write a C Program to sort the given list using merge sort technique.
3. Write a C Program to search an element using linear search technique and recursive binary search technique.
4. Write a C Program to implement Stack.
5. Write a C Program to convert an infix expression to postfix.
6. Write a C Program to implement simple queue.
7. Write a C Program to implement linear linked list.
8. Write a C Program to implement traversal of a binary tree.

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Code: CAC05	Course Object Oriented Programming concepts using JAVA
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

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

- Understand the features of Java and the architecture of JVM
- Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done
- Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
- The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language
- Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

Content	Hours
Unit - 1	
Introduction to OOPS and Java: OOPS concepts and paradigm, Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, method Overloading, Math class, Arrays in java.	08
Unit - 2	
Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference, I/O streams.	10
Unit-3	
Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	08

Unit-4	
Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.	6
Unit - 5	
Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.	10

Text Books

1. Programming with Java, By E Balagurusamy – A Primer, Fourth Edition, TataMcGraw Hill Education Private Limited.
2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall
3. Object Oriented Programming with Java : Somashekara, M.T., Guru, D.S.,Manjunatha, K.S

Reference Books:

1. Java 2 - The Complete Reference – McGraw Hill publication.
2. Java - The Complete Reference, 7th Edition, By Herbert Schildt– McGraw Hillpublication.

Course Code: CAC05P	Course Title: JAVA Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 04 Hours

Course Outcomes (COs):

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

- Implement Object Oriented programming concept using basic syntaxes of control Structures
- Identify classes, objects, members of a class and the relationships among them needed for finding the solution to specific problem
- Demonstrates how to achieve reusability using inheritance
- Demonstrate understanding and use of interfaces, packages, different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
- Identify and describe common user interface components to design GUI in Java using Applet & AWT along with response to events

PART A: Java Fundamentals OOPs in Java

1. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.
2. Program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide. A main function should access the methods and perform the mathematical operations.
3. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values.
4. Program to create a student class with following attributes;
Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, TotalMarks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of n student objects and display the details.
5. In a college first year class are having the following attributes Name of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class. Define a class called first year with above attributes and define a suitable constructor. Also write a method called best Student () which process a first-year object and return the student with the highest total mark. In the main method define a first-year object and find the best student of this class
6. Program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of

appointment. ie, print them as per their seniority.

PART B: Exception Handling & GUI Programming

1. Program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.
2. Program which create and displays a message on the window
3. Program to draw several shapes in the created window
4. Program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother also appear.
5. Program to move any one shape according to the arrow key pressed.
6. Program to create a window when we press M or m the window displays Good Morning, A or a the window displays Good After Noon E or e the window displays Good Evening, N or n the window displays Good Night
7. Demonstrate the various mouse handling events using suitable example.
8. Program to create menu bar and pull-down menus.

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Code: CAC06	Course Title: Discrete Mathematical Structures
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

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

- To understand the basic concepts of Mathematical reasoning, set and functions.
- To understand various counting techniques and principle of inclusion and exclusions.
- Understand the concepts of various types of relations, partial ordering and equivalence relations.
- Apply the concepts of generating functions to solve the recurrence relations.
- Familiarize the fundamental concepts of graph theory and shortest path algorithm

Discrete Mathematical Structures

Content	Hours
Unit - 1	
The Foundations: Logic and proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy. Basic Structures: Sets, Functions, Sequences, Sums, and Matrices: Sets, set operations, Functions, Sequences and Summations, matrices.	12
Unit - 2	
Counting: Basics of counting, Pigeonhole principle, Permutation and combination, Binomial Coefficient and Combination, Generating Permutation and Combination. Advanced Counting Techniques: Applications of Recurrence Relations, Solving Linear Recurrence, Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion-exclusion	10

Unit - 3	
Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Relation: Properties of relation, Composition of relation, Closer operation on relation, Equivalence relation and partition. Operation on relation, Representing relation.	12
Unit-4	
Graphs: Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.	08

Text Book:

1. Discrete Mathematics and Its Applications, Kenneth H. Rosen: Seventh Edition, 2012.

References:

1. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross, 2003.
2. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI 1986.
3. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5 Edition.
4. Discrete Mathematical Structures, Trembley and Manohar.

BCA-Semester -III

Course Title: Database Management Systems	Course code: CAC07
Total Contact Hours: 42	Course Credits: 04
Formative Assessment Marks: 40	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Explain the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using DBMS.
- Demonstrate a Data model and Schemas in RDBMS.
- Identify entities and relationships and draw ER diagram for a given real-world problem.
- Convert an ER diagram to a database schema and deduce it to the desired normal form.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Explain the transaction processing and concurrency control techniques.

Database Management Systems (DBMS)

Unit	Description	Hours
1	Database Architecture: Introduction to Database system applications. Characteristics and Purpose of database approach. People associated with Database system. Data models. Database schema. Database architecture. Data independence. Database languages, and classification of DBMS.	10
2	E-R Model: Entity-Relationship modeling: E – R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship types, roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E -R diagram.	10
3	Relational Data Model: Relational model concepts. Characteristics of relations. Relational model constraints: Domain constraints, key constraints, primary & foreign key constraints, integrity constraints and null values. Relational Algebra: Basic Relational Algebra operations. Set theoretical operations on relations. JOIN operations.	12

4	SQL and Data Normalization: SQL - Aggregate Functions and Grouping. Nested Sub Queries, Views. Normalization - Anomalies in relational database design. Decomposition. Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form.	10
5	<p>Introduction to PL/SQL programming: Introduction to PL/SQL • Features and Advantages, PL/SQL Blocks - basic syntax, Variables and their scope, Constants, Literals, Data Types, Operators, Executable Statements.</p> <p>Control Execution Flow • Conditional Control: IF Statements • CASE Statements • Iterative Control: Basic Loops -WHILE and FOR Loops, Reverse FOR LOOP Statement, Nested Loops, Labeling a PL/SQL Loop, exception handling.</p> <p>STRINGS: Declaring String Variables, String Functions and Operators, ARRAYS: Creating a Varray Type. Cursors - Implicit and Explicit Cursors, Cursor Attributes, parameterized Cursor, Functions and procedure – syntax and usage.</p>	10

References:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015
2. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
3. Introduction to Database System, C J Date, Pearson, 1999.
4. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.
5. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002
6. Oracle Database 11G PL/SQL Programming

Course Code: CAC07P	Course Title: DBMS LAB
Course Credits: 02	Hour of Teaching/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 03

Course Outcomes (COs):

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

- Formulate query, using SQL, solutions to a broad range of query and data update problems
- using SQL in database creation and interaction
- Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system
- Use a desktop database package to create, populate, maintain, and query a database.
- Analyze an information storage problem and derive an information model expressed in the form and views
- Formulate PL SQL query blocks using cursor

Programming Lab

PART A: SQL Queries

1. Implementation of DDL and DML commands of SQL with suitable examples
a) Create table b) Alter table c) Drop Table d) Insert e) Update f) Delete
2. Implementation of different types of constraints.
3. Implementation of different types of Joins
a) Inner Join b) Outer Join c) Natural Join
4. Study and Implementation of
a) Group By &having clause b) Order by clause
5. Implementation of Views
6. Execute DCL and TCL Commands

PART B: PL/SQL

1. Create a library table with attributes book id, author_name, publisher, price and edition. Write PL/SQL code block to accept the publisher's name and count number of books under that publisher and display it. Also display the publisher with maximum publication.
2. Write a function to display employee name with distinct salaries
For e.g.
if a 's salary is 100
b 's salary is 200
c 's salary is 100 displays either (a or c) and b
3. Write a function to rank the employees based on their salary (use RANK function)
4. Write a function to validate the Employee email id.
5. Write a procedure to capture the error log in a table in case of an exception using Autonomous_transaction, from employee table, store ename and salary in varrays and display the contents of the arrays in table format.
6. Write an Anonymous block which raise a user defined exception on Thursday?

7. Write a PL/SQL cursor program which is used to calculate total salary from emp table without using sum () function?

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Title: C# and Dot Net Framework	Course code: CAC08
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Describe Object Oriented Programming concepts like Inheritance and Polymorphism in C# programming language.
- Interpret and Develop Interfaces for real-time applications.
- Build custom collections and generics in C#.

C# and Dot Net Framework

Unit	Description	Hours
1	<p>Introduction to C# and .NET platform and Building C# applications</p> <p>Introduction to C# and .NET platform: .NET solution, Building blocks of the .NET platform, Role of .NET base class libraries, .NET aware programming languages, Role of CIL, Role of Type Metadata, Role of Assembly Manifest, Tour of .NET namespaces.</p> <p>Building C# applications: Role of command line compiler(csc.exe), Building a C# application using csc.exe, command line debugger(cordbg.exe), Introduction to visual studio .NET IDE and its debugging, C# pre-processor directives.</p>	08
2	<p>C# language fundamentals: Anatomy of a basic C# class, Objects, Constructors, Default assignment and variables scope, Variable initialization syntax, Basic I/O with Console class, Arrays and String manipulation, Encapsulation services - Accessor and mutator methods, Class properties, Read and Write only properties, static properties. Inheritance - IS and AS keyword usage, Controlling Base class creation with base, Sealed classes, Delegation. Polymorphism - Virtual and override keywords, Abstract classes, Abstract Methods.</p>	08
3	<p>Exception & object life time and Interface and Collections:</p> <p>Exception & object life time: The Basics of Object Life Time, The Role Of Application Roots, Understanding Object Generations, The Role Of .NET Exception Handling, Throwing a Generic Exception, Catching Exceptions, Properties of Exception, Multiple Exception (Concepts Only). The Finally Block.</p> <p>Interface & Collections: Definition, Implementing an Interface in C#, Interface member sat object level, Interface as Parameters, Interface as Return Values, Arrays of Interface Types, Interface Hierarchies, Interface as polymorphic agents, Exploring the system. Collections Namespaces.</p>	08

4	Introducing windows forms: Overview of the system. windows. Forms Namespaces, An Anatomy of a Form, A Simple Form Program, Function with Control Class, The Functionality of the Form Class, Component class, control class, Programming with windows forms controls: Working with Button types, Check Boxes, Radio Buttons, Group Boxes, List Boxes, Calendar control, Timer, picture box, group box, scroll bar, Progress bar, assigning tool tips for controls. Developing an UI.	10
5	ADO .NET Connectivity: The Two Faces Of ADO. NET, Understanding ADO.NET Data Providers, Understanding the Connected Layer of ADO.NET, Working with Connection Object, Inserting, Updating and Deleting Records.	08

References:

1. "Programming in C#", E. Balagurusamy, 4th Edition, Tata McGraw-Hill, 2017.
2. "Pro C# with .NET 3.0", Andrew Troelsen
3. "Computing with C# and the .NET Framework", Arthur Gittleman, 2nd Edition, Jones & Bartlett Publishers, 2011

Course Code: CAC08P	Course Title: C# and Dot Net Framework Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 04 Hours

Practical:

Part - A

1. Develop a C# .NET console application to demonstrate the conditional statements.
2. Develop a C# .NET console application to demonstrate the control statements.
3. Develop a C#.NET console application to demonstrate exception handling.
4. Develop a C#.NET console application to find sum of all elements present in jagged array of 3 inner arrays.
5. Demonstrate arrays of interface types in C#.NET.
6. Construct a console application to demonstrate abstract class and abstract method.

Part – B

1. C#.NET console application to demonstrate window controls.
2. Demonstrate subroutines and functions I C#.net
3. Assume that 10 candidates have participated in an army selection drive. In the first round of selection, candidates are short listed based on their height. Minimum height for the selection is 157.5 cms. Read the height of those 10 candidates in centimeters and list the heights which are equal to or more than the minimum height required for the selection. Also count the number of candidates who have been shortlisted like this. (Program can be written with or without array).
4. Read 10 register numbers randomly and segregate them based on the course (BA, BSc, BCom, BCA) and semester (first, third, fifth- Analyse the format of the register numbers as assigned by the university).
5. C# program to call math operations (Any 4) using delegates.
6. Design an option driven program to demonstrate following garbage collection activities
 - a) Number of generations
 - b) Generation number of target object
 - c) Number of bytes allocated.
7. Develop an application in C#.NET that demonstrates the registration and login dynamically.

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Title: Computer Communication and Networks	Course code: CAC09
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Explain the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Apply the basics of data communication and various types of computer networks in real world applications.
- Compare the different layers of protocols.
- Compare the key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI.

Computer Communication and Networks

Unit	Description	Hours
1	Introduction: Computer Network-Types & Applications, Network Software-Protocol Hierarchies, Network Topologies, LAN, WAN, MAN, OSI/ISO reference model, TCP/IP reference model, Comparison between OSI & TCP.	08
2	Physical Layer: Transmission Media – Twisted pair, coaxial cable, optical fiber, radio transmission, microwave transmission and infrared transmission, switching – Circuit switching, Packet switching, Difference between Circuit switching & Packet switching.	07
3	Data Link Layer: Data Link Layer design issues, Error detection – Single parity checking, Checksum, polynomial codes – CRC, Error correction- Hamming code, Elementary data link protocols- Unrestricted Simplex Protocol and Simplex Stop-and-Wait Protocol	08
4	Network Layer: Network layer design issues, Routing algorithms –Optimality Principle, Shortest path routing, Distance vector routing, Link state routing, Congestion & Congestion control algorithms – General Principles of Congestion control, Congestion Prevention Policies, Traffic Shaping-Leaky bucket algorithm, token bucket algorithm.	09

5	Transport Layer and Application Layer: Services provided by Transport layer to its upper layers, Transport Service primitives, Elements of Transport protocols, Internet transport protocols- UDP header & TCP segment header, Difference between TCP & UDP, DNS, Architecture & Services of E- Mail and Architecture of World Wide Web.	10
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References:

1. Computer Networks, Andrew S. Tanenbaum, 5th Edition, Pearson Education, 2010.
2. Data Communication & Networking, Behrouza A Forouzan, 3rd Edition, Tata McGraw
3. Hill, 2001.
4. Data and Computer Communications, William Stallings, 10th, Edition, Pearson Education, 2017.
5. Data Communication and Computer Networks, Brijendra Singh, 3rd Edition, PHI, 2012.
6. Data Communication & Network, Dr. Prasad, Wiley Dreamtech.
7. <http://highered.mheducation.com/sites/0072967757/index.htmls>

BCA-Semester IV

Course Title: Python Programming	Course code: CAC10
Total Contact Hours: 42	Course Credits: 03+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

- At the end of the course, students will be able to:
- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in the handling of loops and creation of functions.
- Identify the methods to create and manipulate lists, tuples and dictionaries.
- Discover the commonly used operations involving file handling.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Develop the emerging applications of relevant fields using Python.

Python Programming

Unit	Description	Hours
1	Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python IDEs; Simple Python Program. Identifiers; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples. Strings: Creating and Storing Strings; Accessing String Characters; the str () function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Python String Methods.	08
2	Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, nested if, while loop, break, continue statements, for loop Statement; range () and exit () functions, pass statement. Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; key Word Arguments; Recursive Functions	08
3	Arrays- what is an array, Access the element of an array, Length of an array, looping array element, adding array elements, Removing array elements and array methods. Passing array as an argument Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Nested Lists. Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries.	08

4	<p>Tuples and Sets: Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.</p> <p>Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally.</p> <p>Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values;</p>	08
5	<p>File Handling: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator.</p> <p>Data analysis: NumPy – introduction, array creation, operations on arrays, panda – introduction, creating data frames and data fetching using simple queries.</p> <p>Data visualization: Introduction to data visualization, matplotlib library, different types of charts using pyplot – line, bar, histogram and pie charts.</p>	10

References:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press. Freely available online @ <https://www.greenteapress.com/thinkpython/thinkCSpy.pdf>, 2015.
2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
3. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, Apress®, 2015
4. Advance Core Python Programming, Meenu Kohli, BPB Publications, 2021.
5. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, Prentice Hall, 2012.
6. Automate the Boring Stuff, Al Sweigart, No Starch Press, Inc, 2015.
7. Data Structures and Program Design Using Python, D Malhotra et al., Mercury Learning and Information LLC, 2021.
8. <http://www.ibiblio.org/g2swap/byteofpython/read/>
9. <https://docs.python.org/3/tutorial/index.html>

Course Title: Python Programming Lab	Course code: CAC10P
Total Contact Hours: 52	Course Credits: 02
Formative Assessment Marks: 25	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 25	

Programs for Practical Component:

Part-A

1. Check if a number belongs to the Fibonacci Sequence
2. Solve Quadratic Equations
3. Find the sum of n natural numbers
4. Display Multiplication Tables
5. Check if a given number is a Prime Number or not
6. Implement a sequential search
7. Explore string functions
8. Read and write into a file

Part-B

1. Create a calculator program
2. Implement Selection Sort
3. Demonstrate exception handling
4. Demonstrate use of Dictionaries.
5. Demonstrate use of Tuples.
6. Drawing Line and bar chart using matplotlib.
7. Create array using NumPy and perform array operations
8. Create data frame from excel sheet and perform simple operations.

Evaluation Scheme for Lab Evaluation Scheme for
Lab Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Title: Computer Multimedia & Animation	Course code: CAC11
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Write a well-designed, interactive Web site with respect to current standards and practices.
- Demonstrate in-depth knowledge of an industry-standard multimedia development tool and its associated scripting language.
- Determine the appropriate use of interactive versus standalone Web applications.

Computer Multimedia & Animation

Unit	Description	Hours
1	Web Design: Origins and evolution of HTML, Basic syntax, Basic text markup, Images, Lists, Tables, Forms, Frame, Overview and features of HTML5.CSS: Introduction, Level soft style sheets, Style specification formats, Select or forms, Property value forms, Font properties, List properties, Color, Alignment of text, The and <div> tags; Overview and features of CSS3. JavaScript: Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input.	10
2	Animation: What is an Animation? The Start and End States, Interpolation, Animations in HTML. All About CSS Animations, creating a Simple Animation, Detailed Look at the CSS Animation Property, Keyframes, Declaring Multiple Animations, Wrap-up. All About CSS Transitions, adding a Transition, Looking at Transitions in Detail, The Longhand Properties, Longhand Properties vs. Shorthand Properties, Working with Multiple Transitions.	09
3	HTML5 – SVG: Viewing SVG Files, Embedding SVG in HTML5, HTML5 – SVG Circle, HTML5 – SVG Rectangle, HTML5 – SVG Line, HTML5 – SVG Ellipse, HTML5 – SVG Polygon, HTML5 – SVG Polyline, HTML5 – SVG Gradients, HTML5 – SVG Star.	08
4	HTML5 – CANVAS: The Rendering Context, Browser Support, HTML5 Canvas Examples, Canvas - Drawing Rectangles, Canvas - Drawing Paths, Canvas - Drawing Lines, Canvas - Drawing Bezier Curves, Canvas - Drawing Quadratic Curves, Canvas - Using Images, Canvas - Create Gradients,	08

5	HTML5 - Styles and Colors: Canvas - Text and Fonts, Canvas - Pattern and Shadow, Canvas - Save and Restore States, Canvas - Translation, Canvas -Rotation, Canvas - Scaling, Canvas - Transforms, HTML5 Canvas - Composition, Canvas – Animations.	07
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References:

1. The Complete Reference HTML and CSS, 5th Edition, Thomas A Powell, 2017.
2. Animation in HTML, CSS, and JavaScript, Kirupa Chinnathambi, CreateSpace Independent Pub, 2013.
3. <https://www.w3.org/Style/CSS/current-work#CSS3>
4. <http://bedford-computing.co.uk/learning/cascading-style-sheets-css/>

Course Title: Computer Multimedia & Animation Lab	Course code: CAC11P
Total Contact Hours: 52	Course Credits: 02
Formative Assessment Marks: 25	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 25	

Programs for practical component

Part A

1. Develop and demonstrate a HTML document that illustrates a) Image as a background b) Hyperlink using an image c) Hyperlink with another web page (A, Base, Href) d) Link to email address, FTP Websites
2. Multimedia: - a) Develop a web page to play audio file using <a>Tag. b) Develop a web page to play video file using <Embed>Tag.
3. Write a JavaScript program to determine whether a given year is a leap year in the Gregorian calendar.
4. Write a JavaScript program to convert temperatures to and from Celsius, Fahrenheit
5. Create an animation using HTML.
6. Create an interactive web page using HTML5 layout tags.
7. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.
8. Demonstrate canvas in HTML5.

Part B

1. Develop and demonstrate a HTML document that illustrates a) the use of Formatting Text. b) Headings tags (H1, H2, H3, H4, H5, H6) c) Font Details (Font Size, Style, Type, Color) d) Setting Color (BG Color)
2. Develop and demonstrate a HTML document that illustrates a) Unordered List (UL) b) Ordered List (OL) and Definition list (DL) c) Table Alignment (Cell Spacing, Cell Padding, Height, Width, Border, Rowspan, colspan) d) Setting Different Table Attributes (Color, Image)
3. Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.
4. Design a timetable and display it in tabular format using html.
5. Design signup form to validate username, password, and phone numbers etc. using Java script
6. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient
7. Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems: a. Parameter: A string b. Output: The position in the string of the left-most vowel c. Parameter: A number d. Output: The number with its digits in the reverse order
8. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).

Evaluation Scheme for Lab Evaluation Scheme for Lab
Examination

Assessment Criteria		Marks
Program -1 from Part A	Write up of the program -1	5
Program -2 from Part B	Write up of the program -2	5
Execution and formatting (Any one program)		10
Viva Voce based on Lab Activities		05
Total		25

Course Title: Operating System Concepts	Course code: CAC12
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Explain the fundamentals of the operating system.
- Comprehend multithreaded programming, process management, process synchronization, memory management and storage management.
- Compare the performance of Scheduling Algorithms
- Identify the features of I/O and File handling methods.

Operating System Concepts

Unit	Description	Hours
1	Introduction to Operating System: Definition of Operating System, Early systems – Batch Systems, Multiprogramming, Time Sharing, and Distributed systems. Special Purpose Systems – Real Time Systems and Handheld Systems. Opensource Operating Systems. Process Management: Process Concept- Process Definition, Process State, Process Control Block, Process scheduling- Scheduling Queues, Schedulers, Context switch. Operations on Processes- Creation and Termination of Processes. Inter process communication (IPC) - Definition, Independent and Co-operating processes.	10
2	CPU Scheduling: CPU I/O burst cycle, CPU Scheduler, Preemptive scheduling, Dispatcher. Scheduling criteria, Scheduling Algorithms- First-Come-First-Served (FCFS), Shortest Job First (SJF), Priority Scheduling, Round Robin scheduling algorithms, Multi-level queue scheduling (Concepts only) and Multi- level feedback queue scheduling (Concepts only). Multiple processor scheduling, Real time scheduling.	10
3	Deadlocks: Definition with example, System Model, Deadlocks Characterization- – Necessary Conditions, Resource Allocation Graph, Methods for Handling Deadlocks -Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.	08
4	Memory Management: Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Virtual Memory: Definition, Demand Paging, Page Replacement Algorithms, Allocation of frames, Thrashing.	08

5	File System: File Concepts- Attributes, Operations and Types of Files. File Access methods, Directory Structure, Protection and consistency semantics. File System Implementation- File System Structure, File Allocation Methods, Free Space Management.	06
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References:

1. Operating System Concepts, Silberschatz' et al., 10th Edition, Wiley, 2018.
2. Operating System Concepts - Engineering Handbook, Ghosh PK, 2019.
3. Understanding Operating Systems, McHoes A et al., 7th Edition, Cengage Learning, 2014.
4. Operating Systems - Internals and Design Principles, William Stallings, 9th Edition, Pearson.
5. Operating Systems – A Concept Based Approach, Dhamdhare, 3rd Edition, McGrawHill Education India.
6. Modern Operating Systems, Andrew S Tanenbaum, 4th Edition, Pearson.

Syllabus for Open Electives in Computer Science:

Course Code: CSOE01	Course Title: Computer Fundamentals
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

- Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers
- Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting
- Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not in
- Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching
- Web Programming basics, introduction of HTML and CSS programming
- Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.

Content	Hours
Unit - 1	
Fundamentals of Computers: Introduction to Computers - Computer Definition, Evolution and History of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples(at least 5 hours of teaching) .	10
Unit-2	
Introduction to Computer: Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Super computers. Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Storage units, Input and output Devices. How CPU and	10

memory works. Program execution with illustrative examples. Introduction to microcontrollers.	
Unit-3	
Operating System Fundamentals: Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Microkernel Based Operating System, Booting.	08
Unit-4	
Introduction to Database Management Systems: Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL with constraints, DML, DCL, TCL	08
Unit-5	
Internet Basics: Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System. Web Basics: Introduction to web, web browsers, http/https, URL, HTML5, CSS	06

Text Books:

3. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication
4. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,

Reference:

3. J. Glenn Brook shear," Computer Science: An Overview", Addison-Wesley, Twelfth Edition,
4. R.G. Dromey, "How to solve it by Computer", PHI,

Course Code: CSOE02	Course Title: Problem Solving and C Programming Concepts
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

- Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers
- Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting
- Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not in
- Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching
- Web Programming basics, introduction of HTML and CSS programming
- Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.

Course Content

Content	Hours
Unit – 1	
Problem Solving Techniques: Problem solving techniques – problem definition, analysis, design, debugging, testing, documentation and maintenance. Design Tools -ALGORITHM: definition, characteristics, advantages and disadvantages. FLOWCHART - definition, symbols, advantages and disadvantages. Writing an algorithm and flowchart: Area of circle, arithmetical operations, simple interest and compound interest, quadratic equation, largest of three numbers, sum of N natural numbers, factorial of number, Fibonacci series, prime number, reverse a given number, evaluation of series like $\sin(x)$, $\cos(x)$, e^x , $\log(x)$ etc.	10
Unit-2	
Introduction to C Programming: Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants, Formatted I/O functions - <i>printf</i> and <i>scanf</i> .	10
Unit-3	

C Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associativity; Evaluation of arithmetic expressions; Type conversion.	08
Unit-4	
Decision making, branching and looping: Decision making - if and if-else statement, nested if, else if ladder, switch statements, conditional operator, goto statement. Looping - while, do-while and for, nested for. break and continue statements. Programs on these concepts.	08
Unit-5	
Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation.	06

References :

1. Computer Concepts and Programming, Padma Reddy
2. Let us C , Yashwanth Kanetkar
3. Ansi C, Balagurusamy
4. Problem solving with C, M. T. Somashekara and D. S. Guru

Course Code: CSOE03	Course Title: Office Automation
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Content	Hours
Unit – 1	
Windows Desktop - GUI: Definition, Standards, Cursors/Pointers, Icons, GUI Menus, GUI-Share Data – Desktop icons and their functions: My computer, My documents, Network neighbourhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar – Dialog Boxes: List Box, Spin Control Box, Slide, Drop-down list, Radio button, Check box, Text box, Task Bar - System Tray - Quick launch tool bar - Start button - Parts of Windows -Title bar-Menu bar - Scroll bar- Status bar, Maximize, Minimize, close and Resize & Moving a Window – Windows - Start Menu –Help Menu- Preview Menu; Logoff & Shutdown – Keyboard Accelerators: Key board short keys or hotkeys	06
Unit-2	
MS Word - Working with Documents -Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help, Formatting Documents - Setting Font styles, Font selection- style, size, colour etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering. Setting Page style - Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes – Shortcut Keys; Inserting manual page break, Column break and line break, creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master Documents, Web page. Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula, Drawing - Inserting ClipArt, Pictures/Files etc., Tools – Word Completion, Spell	10

Checks, Mail merge, Templates, Printing Documents – Shortcut keys.	
Unit-3	
MS Excel: Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, saving files, setting Margins, converting files to different formats (importing, exporting, sending files to others), Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys. Entering & Deleting Data- Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc., Inserting Functions, Manual breaks, Setting Formula - finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae. Formatting Spreadsheets, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc., Borders & Shading – Shortcut keys. Working with sheets – Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts - Drawing. Printing. Using Tools.	10
Unit-4	
MS Power point: Introduction to presentation – Opening new presentation, Different presentation templates, setting backgrounds, Selecting presentation layouts. Creating a presentation - Setting Presentation style, Adding text to the Presentation. Formatting a Presentation - Adding style, Colour, gradient fills, arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Drawing Pictures using Draw. Adding Effects to the Presentation- Setting Animation & transition effect. Printing Handouts, Generating Standalone Presentation viewer.	10

Unit-5	
Internet and Web Browsers: Definition of Web Addressing-URL-Different types of Internet Connections; Dial up connection, Broad band (ISDN, DSL, Cable), Wireless (Wi-Fi, Wi-Max, Satellite, Mobile) naming convention, browsers and its types, internet browsing, searching - Search Engines - Portals - Social Networking sites- Blogs - viewing a webpage, downloading and uploading the website; Creating an email-ID, e-mail reading, saving, printing, forwarding and deleting the mails, checking the mails, viewing and running file attachments, addressing with cc and bcc.	06

References:

1. Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2. Microsoft Office 2007 Bible - John Walkenbach,Herb Tyson,Faithe Wempen,cary N.Prague,Michael R.groh,Peter G.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
3. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications.
4. Computer & Internet Basics Step-by-Step - Etc-end the Clutter - Infinity Publishing.
5. <https://en.wikipedia.org>
6. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

ELECTRONIC - COMMERCE

Course Code: CSOE04	Course Title: ELECTRONIC COMMERCE
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

- Compare how internet and other information technologies support business processes.
- Demonstrate an overall perspective of the importance of application of internet technologies in business administration
- Explain the basic business management concepts.
- Demonstrate the basic technical concepts relating to E-Commerce.
- Identify the security issues, threats and challenges of E-Commerce.

Content Hours

Unit – 1	
Introduction to E-Commerce and Technology Infrastructure Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML	9
Unit-2	
Building an E-Commerce Website, Mobile Site and Apps: Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App	10
Unit-3	
E-Commerce Security and Payment Systems: E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems	09

Unit-4	
Business Concepts in E-Commerce: Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce	09
Unit-5	
Project Case Study: Case Study: Identify Key components, strategy, B2B, B2C Models of E-commerce Business model of any e-commerce website - Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencart	05

Text Book:

1. Kenneth C. Laudon, Carol Guercio Traver - E-Commerce, Pearson, 10th Edition, 2016

References:

1. <http://docs.opencart.com/>
2. <http://devdocs.magento.com/>
3. <http://doc.prestashop.com/display/PS15/Developer+tutorials>
4. Robbert Ravensbergen, —Building E-Commerce Solutions with Woo Commerce||, PACKT, 2nd Edition

WEB DESIGNING

Course Code: CSOE05	Course Title: WEB DESIGNING
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

- Students can understand the basics of internet technology.
- Demonstrate the various tags useful to create a web page.
- Write HTML and understand how to effectively implement it in the web environment.
- Write CSS effectively to create well organized, styled web pages.

Content	Hours
Unit – 1	
Internet Basics: Basic concepts, communicating on the Internet, Internet Domains, Internet server identities – Registering a virtual domain with inter NIC, Domain Name Extension, establishing connectivity on the internet, Client IP Address – How Client IP Address are assigned, How ISPs achieve the task of assigning IP Address, How IP Address came into existence, A brief overview of TCP/IP and its services – Internet Protocol, Transmission control protocol – world wide web, FTP, Telnet.	08
Unit-2	
Introduction to HTML - Information files creation, Web server, Web browser – understanding how a browser communicates with a web server, establish connection, Client issues a request and sends a response, server terminates the connection.	10
Unit-3	
HTML: HTML tags, Paired tags, Singular tags, Structure of HTML program – Head, Body, Title and footers, Text Formatting tags – Paragraph breaks, line breaks,	08

Head styles, Drawing Lines, Text Styles – Bold, Italic, Underline, Centering (Text, Images., etc.). Lists: Types of Lists: Unordered list (Bullets), Ordered list (Numbering), Definition list Adding Graphics to HTML document: Using the border attribute, width and height attribute, align attribute, alt attribute. Tables: Introduction, the caption tag, Using the width and border attribute, cellpadding attribute, cellspacing attribute, the background-color property, the colspan and Rowspan attribute.	
Unit-4	
Linking Documents: External document references, Internal document references, hyper linking to a HTML FILE, Images as Hyperlinks. Frames: Introduction to frames- frameset tag, frame tag	08
Unit-5	
Dynamic HTML(DHTML): CSS (Cascading Style Sheets) – Font attributes, color and background attributes, Text attribute, Border attribute, Margin attributes, List attribute, Using the span and div tags, External Style Sheets.	08

Text Book:

1.HTML, JavaScript, DHTML and PHP – Ivan Bayross 4th edition

References:

1. <https://www.w3schools.com/TAGs/default.asp>
2. <https://w3schools.sinsixx.com/dhtml/>
3. Web Design with HTML & CSS: HTML & CSS Complete Beginner's Guide – Prem Kumar

Skill Enhancement Course:
BCA THIRD SEMESTER
Open-Source Tools

Course Code: SEC-1	Course Title: Open-Source tools
Course Credits: 02	Hours/Week: Theory -15 hour + 30 hours practical demonstration in classroom
Total Contact Hours: 45	Formative Assessment Marks: 25
Summative Assessments Marks: 25	Exam Duration: 01 hr.

course Outcomes (COs):

- Recognize the benefits and features of Opensource Technology and to interpret, contrast and compare opensource products among themselves
- Use appropriate opensource tools based on the nature of the problem
- Write code and compile different open-source software.

Course Content (Open-Source Tools)

Module	Details of topic	Duration
Module 1: Open Source Softwares	i. Introduction to Open sources, Need of Open Sources, Open Source –Principles, Standard Requirements, Advantages of Open Sources – ii. Free Software – FOSS iii. Licenses – GPL, LGPL, Copyrights, Patents, Contracts & Licenses and Related Issues iv. Application of Open Sources. Open-Source Operating Systems: FEDORA, UBUNTU	05 hours
Module 2: Programming Tools and Techniques	i. Usage of design Tools like Argo UML or equivalent ii. Version Control Systems like Git or equivalent iii. Bug Tracking Systems (Trac, BugZilla) iv. Bootstrap	05 hours

Module 3: Case Studies	i. Apache ii. Berkeley Software Distribution iii. Mozilla (Firefox) iv. Wikipedia v. Joomla vi. GNU Compiler Collection vii. Libre Office	05 hours
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Text Book:

1. KailashVadera, Bhavyesh Gandhi, "Open-Source Technology", Laxmi Publications Pvt.Ltd 2012, 1st Edition.

Reference Book:

1. Fadi P. Deek and James A. M. McHugh, "Open Source: Technology and Policy", Cambridge Universities Press 2007.

Pattern of continuous Evaluation and Semester End Examination

Total Marks for each course = 100

Continuous assessment (C1) = 20 marks

Continuous assessment (C2) = 20 marks

Semester End Examination (C3) = 60 marks

Formative evaluation process (Internal Assessment).

- a. The first component (C1) of assessment is for 20 marks. This shall be based on tests, assignments, seminars, case studies, fieldwork, project work etc. This assessment and score process should be completed after completing 50% of the syllabus of the course/s and within 45 working days of the semester program.
- b. The second component (C2) of assessment is for 20 marks. This shall be based on the test, assignment, seminar, case study, fieldwork, internship / industrial practicum/project work etc. This assessment and score process should be based on the completion of the remaining 50 per cent of the syllabus of the courses of the semester.

Summative evaluation process (Semester End theory Examination).

During the 17th – 19th week of the semester, a semester-end examination shall be conducted by the University for each course. This forms the third and final component of assessment (C3) and the maximum marks for the final component will be 60 marks.

Practical Examination: For the practical course of full credits, marks shall be for **50 marks** awarded as follows

Internal Assessment for 25 Marks: 15 Marks for maintaining Practical record and 10 marks for practical test. Test shall be conducted after the completion of Practical Classes.

End Semester Practical Examination: End Semester Practical examination shall be conducted for 25 marks.

Syllabus Distribution for Question Paper Setting		
Section-I	Ten Questions of each carrying 02 marks	Two questions from each unit
Section -II	Eight Questions of each carrying 03 marks	At least one question from each unit and remaining questions from those units with higher teaching hours
Section -III	Five Questions of each carrying 05 marks	At least one question from each unit.
Section -IV	Four Questions of each carrying 10 marks	First question from unit-1 or Second question from unit-2 ----- Third question from unit-3 or Fourth question from unit 4 & unit 5