SRI DHARMASTHALA MANJUNATHESHWARA COLLEGE (AUTONOMOUS)

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DEPARTMENT OF COMPUTER SCIENCE

Syllabus of

Bachelor's Degree in
COMPUTER APPLICATION (BCA)

CHOICE BASED CREDIT SYSTEM
SEMESTER SCHEME
UNDER NEW EDUCATION POLICY 2020
2021-22 ONWARDS

BOS meeting held on 19-08-2023
Academic Council meeting, held on 02-09-2023

Preamble

Computer Application (CA) has been evolving as an important branch of science and technology in last two 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 specialization in Computer Science were introduced to train manpower in this highly demanding area.

BCA (Basic) 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 (Basic) aims at laying a strong foundation of computer application at an early stage of the career. There are several employment opportunities and after successful completion of BCA, graduating students can fetch employment directly in

companies as programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

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

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

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

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation
- To develop the ability to use this knowledge to analyse new situations in the application domain
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
- To learn skills and tools like mathematics, statistics and electronics to find the solution, interpret the results and make predictions for the future developments
- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate

The objectives of the Programme are:

1. The primary objective of this program is to 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.

C5. Model Programme Structure for Bachelor of Computer Applications (Basic) with Computer Applications as Programme Core Subject with Practical

Sem.	Discipline Core (DSC) (Credits)	DisciplineElective (DSE) / Open Elective (OE) (Credits)	Ability Enhancement Compulsory Courses (AECC), Languages (Credits) (L+T+P)		Skill Enhancement Courses (SEC)			Total Credits
					Skill based (Credits) (L+T+P)	Value based (Credits) (L+T+P)		
I	CA C-1 (3+2) CA C-2 (3+2) CA C-3 (3)	OE-1 (3)	L1-1(3), L2-1(3) (4 hrs. each)		SEC-1: Digital Fluency (2) (1+0+2)	Yoga (1) (0+0+2)	Health & Wellness (1) (0+0+2)	26
II	CA C-4 (3+2) CA C-5 (3+2) CA C-6 (3)	OE-2 (3)	L1-2(3), L2-2(3) (4 hrs. each)	Environmental Studies (2)		Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	26
Exit option with Certificatein Computer Applications (with the completion of courses equivalent to a minimum of 48 credits)								
III	CA C-7 (3+2) CA C-8 (3+2) CA C-9 (3)	OE-3 (3)	L1-3(3), L2-3(3) (4 hrs each)		SEC-2: Artificial Intelligence or some other SEC (2) (1+0+2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/Cultural (1) (0+0+2)	26
IV	CA C-10 (3+2) CA C-11 (3+2) CA C-12 (3)	OE-4 (3)	L1-4(3), L2-4(3) (4 hrs each)	Constitution of India (2)		Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/Cultural (1) (0+0+2)	26
Exit option with Diploma in Computer Applications (with the completion of courses equivalent to a minimum of 96 credits)								
V	CA C-13 (3+2) CA C-14 (3+2) CA C-15 (3)	CA E-1 (3) Vocational-1 (3)			SEC-3: Cyber Security or some other SEC (2) (1+0+2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/Cultural (1) (0+0+2)	23
VI	CA C-16 (3+2) CA C-17 (3+2) CA C-18 (3)	CA E-2 (3) Vocational-2 (3) Internship (2)			SEC-4: Professional Communication (2)	Sports (1) (0+0+2)	NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25

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			
	iv. LAB: Data Structure		4		
	v. LAB: JAVA Lab		4		
3	i. Data Base Management Systems	3			
	ii. C# and DOT NET Framework	3			
	iii. Operating Systems Concepts	3			
	iv. LAB: DBMS		4		
	v. LAB: C# and DOT NET Framework		4		
4	i. Python Programming	3			
	ii. Computer Multimedia and Animation iii.Computer Communication and Networks	3	4		
	iv. LAB: Multimedia and Animation		4		
	v. LAB: Python programming				
5	i. Internet Technologies	3		(a) Cyber Law and Cyber Security	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		4		

	CSS vi. Vocational 1	 3			
6	i. Artificial Intelligence and Applications ii. PHP and MySQL iii. LAB: PHP and MySQL iv. PROJECT v. Vocational 2	3 3 3	 4 12 	(a) Fundamentals of Data Science (b) Mobile Application Development (c) Embedded Systems	3 3 3

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	CACT 101	Fundamentals of Computers	3	13	26
	CACT 102	Programming in C	3		
	CACT 103	Mathematical Foundation	3		
	CACP 101	LAB: Information Technology Lab	2		
	CACP 102	LAB: C Programming Lab	2		
II	CACT 151	Data Structures using C	3	13	26
	CACT 152	Object Oriented Concepts using JAVA	3		
	CACT 153	Discrete Mathematical Structures	3		
	CACP 151	LAB: Data Structure	2		
	CACP 152	LAB: JAVA	2		
III	CACT 201	Data Base Management Systems	3	13	26
	CACT 201	C# and DOT NET Framework	3		
		Operating System Concepts	3		
		LAB: DBMS	2		
		LAB: C# and DOT NET Framework	2		
IV		Python Programming	3	13	26
		Computer Multimedia and Animation	3		
		Computer Communication and Networks	3		
		LAB: Python programming	2		

		LAB: Multimedia and Animation	2		
V		Internet Technologies	3	10	23
		Statistical Computing and R Programming	3		
		Software Engineering	3		
		LAB: JAVA Script, HTML and CSS	2		
		LAB: R Programming	2		
VI		PHP and MySQL	3	10	23
		Artificial Intelligence and Applications	3		
		LAB: PHP and MySQL	2		
		Project Work	5		

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	CACT 101, CACT 102, CACT 103, CACP 101, CACP 102, CACT 151 CACT 152, CACT 153, CACP 151,CACP 152	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 -1	Elective	DTP, CAD and Multimedia OR Hardware and Server Maintenance OR Web Content Management Systems
	Vocational -2	Elective	

Vocational	Vocational -3	Elective	OR Computer Networking OR Health Care Technologies OR Digital Marketing OR Office Automation
	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.

COURSE PATTERN AND SCHEME FOR BCA

Group	Code	Title	Hours /week	Exam in hours	Marks			Credits
					IA	Exam	Total	
I Sem								
DCC	CACT 101	Fundamentals of Computers	3	2	40	60	100	3
DCC	CACT 102	Programming in C	3	2	40	60	100	3
DCC	CACT 103	Mathematical Foundation	3	2	40	60	100	3
DCC	CACP 101	Information Technology	4	3	25	25	50	2
DCC	CACP 102	Programming in C	4	3	25	25	50	2
II Sem								
DCC	CACT 151	Data Structures using C	3	2	40	60	100	3
DCC	CACT 152	Object Oriented Concepts using JAVA	3	2	40	60	100	3
DCC	CACT 153	Discrete Mathematical Structures	3	2	40	60	100	3
DCC	CACP 151	Data Structure	4	3	25	25	50	2
DCC	CACP 152	JAVA Lab	4	3	25	25	50	2
III Sem								
DCC	CACT 201	Database Management Systems	3	2	40	60	100	3
DCC	CACT 202	C# and DOT NET Framework	3	2	40	60	100	3
DCC	CACT 203	Computer Communication and Networks	3	2	40	60	100	3
DCC	CACP 201	Database Management Systems	4	3	25	25	50	2
DCC	CACP 202	C# and DOT NET Framework	4	3	25	25	50	2

Group	Code	Title	Hours /week	Exam in hours	Marks			Credits
					IA	Exam	Total	
IV Sem								
DCC	CACT 251	Python Programming	3	2	40	60	100	3
DCC	CACT 252	Computer Multimedia and Animation	3	2	40	60	100	3
DCC	CACT 253	Operating System Concepts	3	2	40	60	100	3
DCC	CACP 251	Python Programming	4	3	25	25	50	2
DCC	CACP 252	Computer Multimedia and Animation	4	3	25	25	50	2
V Sem								
DCC	CACT 301	Design and Analysis of Algorithms	4	2	40	60	100	4
DCC	CACT 302	Statistical Computing and R programming	4	2	40	60	100	4
DCC	CACT 303	Software Engineering	4	2	40	60	100	4
DCC	CACT 304	Cloud Computing	3	2	40	60	100	3
DCV	CACV 301	Digital Marketing	3	2	40	60	100	3
DCC	CACP 301	Design and Analysis of Algorithms-Lab	4	3	25	25	50	2
DCC	CACP 302	R Programming - Lab	4	3	25	25	50	2

Group	Code	Title	Hours /week	Exam in hours	Marks			Credits
					IA	Exam	Total	
VI Sem								
DCC	CACT 351	Artificial Intelligence and Applications	4	2	40	60	100	4
DCC	CACT 352	PHP and MySQL	4	2	40	60	100	4
DCE	CACE 351	Mobile Application Development	3	2	40	60	100	3
DCC	CACP 351	PHP and MySQL- Lab	4	3	25	23	100	4
DCC	CACP 352	PROJECT	12	3	75	75	150	6
DCV	CACV 351	Web Content Management System	3	2	40	60	100	3

CURRICULUM STRUCTURE FOR V AND VI SEMESTER BCA

Semester	Course No	Theory/Practical	Credits	Paper Title	S.A	L.A
V	CACT 301	Theory	4	Design & Analysis of Algorithms	60	40
	CACT 301	Practical	2	Design & Analysis of Algorithms Lab	25	25
	CACT 302	Theory	4	Statistical Computing and R Programming	60	40
	CACT 302	Practical	2	R Programming Lab	25	25
	CACT 303	Theory	4	Software Engineering	60	40

	CACT 304	Theory	3	A. Cloud Computing	60	40
	CACV 301	Theory	3	Digital Marketing	60	40
	SEC-4	Theory	3	Employability skills	60	40
VI	CACT 351	Theory	4	Artificial Intelligence and Applications	60	40
	CACT 352	Theory	4	PHP and MySQL	60	40
	CACP 351	Practical	2	PHP and MySQL Lab	25	25
	CACP 352	Project	6	Project Work	75	75
	CACE 351	Theory	3	**A.** Fundamentals of Data Science **B.** Mobile Application Development	60	40
	CACV 351	Theory	3	Web Content Management System	60	40
	SEC-5	Theory/ Practical	2	Internship	30	20

Course Contents for BCA: Semesters I

Course Title: Fundamentals of Computers

Course Code: **CACT 101**	
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:

- Understand the fundamentals of computer system
- Identify different components within the computer system
- Understand different types of input and output devices
- Demonstrate the working concepts of different devices connected to computer
- Explain different generations of programming languages and their significance
- Understand the use of Word processing, Spreadsheet, Presentation and DBMS applications
- Understand Digital computer and digital systems functioning

Course Contents

Contents	Hours
Unit - 1	
Computer Basics: Introduction, Characteristics computers, Evolution computers, Generations of computers, Classification of computers, the computer system, Application of computers. **Computer Architecture:** Introduction, Central processing unit- ALU, Registers, Control unit, system bus, main memory unit, cache memory **Input devices**: Introduction, Types of input devices, Keyboard, Mouse, Track ball, Joystick light pen, Touch screen and track pad. Speech recognition, digital camera, webcam, flatbed scanner **Output devices**: Types of output, Classification of output	12

devices, Printers – Dot matrix, Ink-jet, Laser, Hydra, Plotter, Monitor – CRT, LCD, Differences between LCD and CRT	
Unit – 2	
Computer software: Introduction, software definition, relationship between software and hardware, software categories, Installing and uninstalling software, software piracy, software terminologies. **Computer programming languages**: Introduction, Developing a program, Program development cycle, Types of programming languages, generation of programming languages, Features of a good programming language. **Introduction to Computer Security**: Types of computer crimes, Computer security, Emerging security solutions, crime; security, computer Crime by authorized users, computer crime through unauthorized access, potentially malicious computer programs, Introduction to cryptography. **Computer Viruses, Trojan horse & Worms**: Introduction, types; categories of viruses, Virus vaccines	10
Unit-3	
Digital Computers and Digital System: Introduction to Number System, Decimal number, Binary number, Octal and Hexadecimal numbers, Number base conversion, Complements, Binary codes, Binary arithmetic, Addition, Subtraction in the 1's and 2's complements system, Subtraction in the 9's and 10's complement system. **Boolean Algebra:** Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Venn diagram.	10
Unit-4	
Digital logical gate: Boolean functions, Canonical and Standard forms, Minterms, Maxterms, other logic operations, Digital logic gates, Universal gates. **Simplification of Boolean function:** The map method, Two and three variable maps, Four- variable maps, Don't care conditions, Product of sum simplification.	10

Text Books:

1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition, Pearson
2. M. Morris Mano, Digital Logic and Computer design, PHI, 2015

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

Course Title: Programming in C

Course Code: CACT 103	
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 Contents

Contents	Hours
Unit - 1	
Problem Solving techniques: Introduction, Problem solving procedure. **Algorithm:** Steps involved in algorithm development, Algorithms for simple problems (To find largest of three numbers, factorial of a number, check for prime number, check for palindrome, Count number of odd, even and zeros in a list of integers) **Flowcharts:** Definition, advantages, Symbols used in flow charts. Flowcharts for simple problems mentioned in algorithms. Psuedocode.	12

Overview of C : History of C , Importance of C Program, Basic structure of a C-program, Execution of C Program. **C Programming Basic Concepts:** Character set, C token, Keywords and identifiers, Constants, Variables, data types, Declaration of variables, assigning values to variables, defining symbolic constants. **Input and output with C:** Formatted I/O functions - *printf* and *scanf,* control stings and escape sequences, output specifications with *printf* functions; Unformatted I/O functions to read and display single character and a string - *getchar, putchar, gets* and *puts* functions.	
Unit - 2	
Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively; Evaluation of arithmetic expressions; Type conversion. **Control Structures:** Decision Making and Branching -Decision making with if statement, simple if statement, the if else statement, nesting of if … else statements, the else if ladder, the switch statement, the ?: operator, the go to statement. Decision making and looping - The while statement, the do statement, for statement, nested loops, exit, break, jumps in loops.	10
Unit -3	
Derived data types in C: Arrays - declaration, initialization and access of one-dimensional and two- dimensional arrays. programs using one- and two-dimensional arrays, sorting and searching arrays. **Handling of Strings:** Declaring and initializing string variables, reading strings from terminal, writing strings to screen, Arithmetic operations on characters, String handling functions - *strlen, strcmp, strcpy, strstr and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric* etc. **Pointers:** Understanding pointers, accessing the address of a variable, declaring and initializing pointers, accessing a variable through its pointer, pointer expression,	10

pointer increments and scale factor, pointers and arrays, pointer and strings.	
Unit - 4	
User-defined functions: Need for user-defined functions, Declaring, defining and calling C functions, return values and their types, Categories of functions: With/without arguments, with/without return values. Nesting of functions. **Recursion:** Definition, example programs. **Structures and unions:** Structure definition, giving values to members, structure initialization, comparison of structure variables, arrays of structures, arrays within structures, Structure and functions, structures within structures. Unions	10

Text Book:

1. **E. Balagurusamy, Programming in ANSI C, 7th Edition, Tata McGraw Hill**

Reference Books:

1. Herbert Schildt, C: The Complete Reference, 4th Edition
2. Brain W. Kernighan, C Programming Language, 2nd Edition, Prentice Hall Software
3. Kernighan & Ritchie: The C Programming Language, 2nd Edition, PHI
4. Kamthane, Programming with ANSI and TURBO C, Pearson Education
5. V. Rajaraman, Computer Programming in C, 2nd Edition, PHI
6. S. Byron Gottfried, Programming with C, 2nd Edition, TMH
7. Yashwant Kanitkar, Let us C, 15th Edition, BPB
8. P.B. Kottur, Computer Concepts and Programming in C, 23rd Edition, Sapna Book House

Course Title: Mathematical Foundation

Course Code: **CACT 103**	**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

Course Contents:

Contents	**Hours**
Unit - 1	
Algebra: Logarithms- Introduction, Definition, Laws of operations, change of base **Binomial theorems**- Introduction, Binomial theorem, Position of terms. **Analytical geometry:** Introduction, directed line, midpoint, distance between two points, Section formula, external division, coordinates of a centroid, Area of a triangle. **The straight line** – slope of a straight line, different forms of equations of the straight line. **Circle** -The equation of a circle, different forms of circles, General equation of the circle, equation of tangent and normal to the circle.	12

Unit - 2	
Trigonometry: Introduction, Measurement of angles, trigonometric functions, relation between trigonometric functions, signs of trigonometric functions, trigonometric functions of standard angles. **Calculus**: Limit of function, continuity of a function. **Differentiation**: Derivative of a function of one variable, Power function, constant with a function, sum of functions, product of two functions, quotient of two functions. **Integration**- Indefinite integral, rules of integration, some standard results and examples, definite integral.	10
Unit - 3	
Matrix Algebra: Definition, types of matrices, algebra of matrices – addition of matrices, subtraction of matrices, multiplication of matrices, determinant of a matrix, Adjoint of a matrix, orthogonal and unitary matrix, rank of a matrix, echelon form of a matrix, normal form of a matrix, equivalence of matrices	**10**
Unit - 4	
Inverse of a matrix, Characteristic equation of a matrix, Cayley Hamilton theorem, Eigen values. **System of Linear equations:** solution of Linear homogeneous and non-homogeneous equations (matrix method), Cramer's rule **Arithmetic progression:** Definition, formula for nth term, sum to n terms, Arithmetic mean, problems **Geometric progression:** Definition, formula for nth term, sum to n terms, geometric mean, problems	10

Text Books:

1. C Sanchethi and V K Kapoor, Business Mathematics, Sulthan Chand &Sons Educational publishers, New Delhi, Eleventh Revised Edition
2. P. R. Vittal-Business Mathematics and Statistics, Margham Publications, Chennai
3. Pundir &S.K. Pundir, A Text Book of BCA Mathematcis - I, Rimple A, Pragatis Edition (IV)

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

Course Code: **CACP 101**	**Course Title: Information Technology Lab**
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 20
Exam Marks: 30	Exam Duration: 03

Practice Lab

1. Identification of the peripherals of a computer, components in a CPU and their functions.
2. Assembling and disassembling the system hardware components of personal computer.
3. Basic Computer Hardware Trouble shooting.
4. LAN and WiFi Basics.
5. Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.
6. Activities using word processing, presentation and spreadsheet software
7. Tasks involving Internet Browsing

Information Technology Lab

Part A: Word Processing & Presentation

I. Word Processing

1. Prepare a document using different formatting tools
2. **Prepare a document using SmartArt and Shapes tools**

Highlights of the National Education Policy (NEP) 2020

Note4Students

From UPSC perspective, the following things are important :

Prelims level : National Education Policy

Mains level : Need for imbibing competitiveness in Indian education system

New Policy aims for **universalization of education** from pre-school to secondary level with 100 % Gross Enrolment Ratio (GER) in school education by 2030. NEP 2020 will bring 2 crores out of school children back into the mainstream through the open schooling system.

- *The current 10+2 system to be replaced by a **new 5+3+3+4 curricular structure** corresponding to ages 3-8, 8-11, 11-14, and 14-18 years respectively.* **This will bring the hitherto uncovered age group of 3-6 years under the school curriculum, which has been recognized globally as the crucial stage for the development of mental faculties of a child.**
- The new system will have 12 years of schooling with three years of Anganwadi/ pre-schooling.
  - Emphasis on Foundational Literacy and Numeracy, no rigid separation between academic streams, extracurricular, vocational streams in schools; Vocational Education to start from Class 6 with Internships
  - Teaching up to at least Grade 5 to be in mother tongue/ regional language. No language will be imposed on any student.
- Assessment reforms with **360° Holistic Progress Card**, tracking Student Progress for achieving Learning Outcomes
- A new and comprehensive National Curriculum Framework for Teacher Education, NCFTE 2021, will be formulated by the NCTE in consultation with NCERT.
- By 2030, the minimum degree qualification for teaching will be a 4-year integrated B.Ed. degree.
- Gross Enrolment Ratio in higher education to be raised to **50% by 2035; 3.5 crore seats to be added in higher education.**
- The policy envisages broad-based, multi-disciplinary, holistic Under Graduate Program with flexible curricula, creative combinations of subjects, integration of vocational education and multiple entries and exit points with appropriate certification.
- **Academic Bank of Credits to be established to facilitate Transfer of Credits**

Multidisciplinary Education and Research Universities (MERUs), at par with IITs, IIMs, to be set up as models of best multidisciplinary education of global standards in the country.

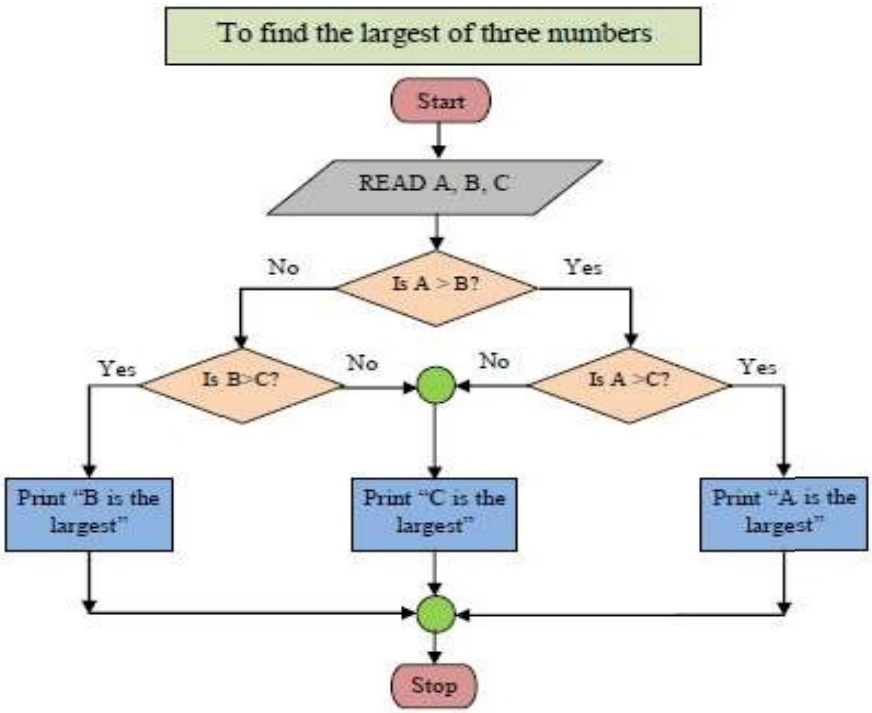
Affiliation of colleges is to be **phased out in 15 years** and a stage-wise mechanism is to be established for granting graded autonomy to colleges.

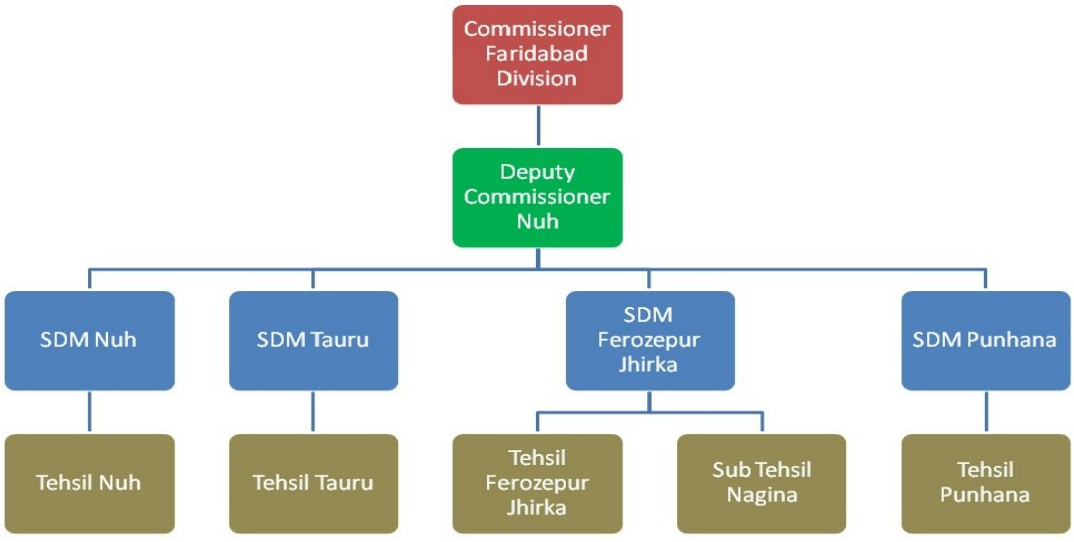
Over a period of time, it is envisaged that every college would develop into either an Autonomous degree-granting College or a constituent college of a university.

$$\frac{df}{dt} = \lim_{h \to 0} \frac{f(t+h) - f(t)}{h}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = (a+b)^2 - 4ab$$
$$a^2 + b^2 = (a-b)^2 + 2ab$$

Organization Chart – Administration Faridabad Division





3. Prepare a document with table to store sales details of a company for different quarters and calculate total, average and find maximum, minimum sales value.

Branch Code	Branch	Sales in Quarters				Total	Avg
		1	2	3	4		
A101	Mangalore	354690	244610	383290	413670		
A102	Udupi						
Total (Across Branches)							
Average (Across Branches)							
Highest Sales (Across Branches)							
Lowest Sales (Across Branches)							

TIME TABLE

Class : I BCA						Room No. 206	
Day	**I**	**II**	**III**	**IV**		**V**	**VI**
Monday					LUNCH BREAK		
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday						***	

4. Prepare interview call letters for five candidates describing about the company and instructions about the interview. Use Mail merge feature

Interview call Letter Format

Date:
[Name of the candidate]
[Address]

Dear [name of the candidate]

This is to the reference of your application for the job [name of the job] indicating interest in seeking employment in our organisation. We thank you for the same.

We would like to inform you that your profile is being shortlisted for the job role and is best suited for it. Therefore, we would like to take a face to face interview with you on [date of interview] at [venue details].

We hope that the venue is suitable for you. If not please get in touch with us, so that we can arrange the date and venue according to your availability.

The company will reimburse you all the expenses incurred by you for this interview. This letter has an attachment in which you need to fill the details and carry it along on the date of interview. Please carry your CV also along with you.

Kindly confirm your availability for the date and venue. If there are any changes to be done, please contact us at phone number: [999xxxx999] and email id: abcnd@mail.com.

We look forward to seeing you.

Regards,
Name of the Manager
Designation Name
Company name

II. Presentation

1. Create a presentation (minimum 5 slides) about your college. It should contain images, chart, Bulletted text, …..
2. Create a presentation (minimum 5 slides) to advertise a product. The slides should be displayed automatically in a loop. Make use of Transition and Animations.
3. A simple quiz program. Use hyperlinks to move to another slide in the presentation to display the result and correct answer/wrong answer status. Use at least four questions.

Part B: Spreadsheet

(Note: Give proper titles, column headings for the worksheet. Insert 10 records for each exercise in such a way to get the result for all the conditions. Format the numbers appropriately wherever needed).

1. Create a worksheet to maintain student information such *as RollNo, Name, Class, Marks in three subjects* of 10 students. Calculate total marks, average and grade. Find grade for Distinction, First class, Second class, Pass and Fail using normally used conditions.
    - Using custom sort, sort the data according to class: - Distinction first, FirstcClass next, and so on. Within each class, average marks should be in descending order.
    - Also draw the Column Chart showing the RollNo versus Average scored.

(Note: Worksheet creation and for marks) atting 4 marks, calculations: 5 marks, sorting: 3 marks, chart: 3

2. Prepare a worksheet to store details of Electricity consumed by customers. Details are Customer No, Customer Name, Meter No, Previous meter reading, Current meter reading of 10 customers. Calculate total number of units consumed and total amount to be paid by each consumer using following conditions:
    - If unit consumed is up to 30, charge is 100.
    - 31 to 100 units, 4.70 per unit
    - 101 to 200 units, 6.25 per unit
    - Above 200 units, 7.30 per unit.
    - Use Data validation to see that current reading is more than previous reading.
    - Arrange the records in the alphabetic order of names.
    - Filter the records whose bill amount is more than Rs.1500.

(Note: Worksheet creation and formatting 4 marks, Data validation: 2 marks, calculations: 5 marks, sorting: 2 marks, filtering: 2 marks)

3. Create Employee worksheet having EmpNo, EmpName, DOJ, Department, Designation and Basic Pay of 8 employees. Calculate DA, HRA, Gross Pay, Profession Tax, Net Pay, Provident Fund as per the rule
:
    - DA = 30% of basic pay
    - HRA = 10% of basic pay if basic pay is less than 25000, 15% of basic pay otherwise.
    - Gross =DA +HRA+ Basic pay
    - Provident fund =12% of Basic pay or Rs.2000, whichever is less.
    - Profession Tax= Rs.100 if Gross pay is less than 10000, Rs.200 otherwise.
    - NetPay = Gross - (Professional tax + Provident Fund)
- Using Pivot table, display the number of employees in each department and represent it using Pie chart.

(Note: Worksheet creation and formatting 4 marks, calculations: 5 marks, Pivot table: 3 marks, Chart: 3 marks)

4. Create a table COMMISSION containing the percentage of commission to be given to salesmen in different zones as follows:

Zone	Percentage
South	10
North	12.5
East	14
West	13

Create another table SALES in the same worksheet to store salesman name, zone name, place, name of the item sold, rate per unit, quantity sold. Calculate total sales amount of each salesman. Referring the COMMISSION table, write the formula to compute the commission to be given.(Hint: Use if function and absolute cell addresses)

Using advanced filtering show the result in other parts of the worksheet.

- Show the records of various zones separately.
- Show the records of only East and West zones.
- Display the details of the items sold more than 50, in South or North zones.

(Note: Worksheet creation and formatting: 4 marks, calculations: 5 marks, filtering: 6 marks)

Evaluation Scheme for Lab Examination :

Assessment Criteria		**Marks**
Activity – 1 from Part A	Word Processing / Presentation	10
Activity - 2 from Part B	Spreadsheet	15
Practical Record		05
Total		**30**

Course Title: C Programming Lab

Course Code: **CACP 102**	**Course Title: C Programming Lab**
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 20
Exam Marks: 30	Exam Duration: 03

Programming Lab

Part A:

1. Program to read marks of five subjects, calculate percentage of marks and to display appropriate grade declaration message (using else-if ladder)
2. Program to find the greatest of three numbers (using nested if statement)
3. Program to read two integer values & a operator as character and perform basic arithmetic operations on them using switch case (+, -, *, / operations)
4. Program to reverse a number and find the sum of individual digits. Also check for palindrome.
5. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
6. Program to count occurrences of a character in a string.
7. Program to calculate and display the first ‘n’ Fibonacci numbers
8. Program to find given number is a prime or not.
9. Program to read a string and find a) length b) reverse of it c) check palindrome string d) merge original & reversed string (using built in string library functions)
10. Program to search for a number in a list of numbers using one-dimensional array.

Part B:

1. Program to find the largest and smallest elements with their position in a one-dimensional array
2. Program to read ‘n’ integer values into a single dimension array and arrange them in

ascending order using bubble sort method.

3. Program to perform addition and subtraction of two Matrices
4. Program to display factorial of first 'n' integers using recursive function.
5. Program to check a number is a Armstrong by defining isArm( ) function
6. Program to read a string and count number of letters, digits, vowels, consonants, spaces and special characters present in it.
7. Program sort a list of strings in ascending order using Pointers
8. Program to add two distances in the inch-feet format using structures (convert inches to feet if greater than 12)
9. Program to enter the information of a student like name, register number, marks in three subjects into a structure and display total, average and grade Display details in a neat form.
10. Program to input Name of the branches, Total sales of company into an array of structures. Display branch details in a tabular format. Also display the branch name that recorded the highest sales.

Evaluation Scheme for Lab Examination :

Assessment Criteria		**Marks**
Program – 1 from Part A	Writing the Program	5
	Execution & Formatting	5
Program -2 from Part B	Writing the Program	7
	Execution & Formatting	8
Practical Record		05
Total		30

Course Title: Office Automation

Course Code: **CSOE 101**	**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

Course Outcomes (COs):

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

- Compare and contrast various types of operating systems
- Explain the purpose of office automation
- Describe how information is stored and retried in/from computer memory
- Know about various types of office automation software and their applications
- Create document using word processing software
- Design presentation using presentation software
- Create worksheets using spreadsheet software
- Store and retrieve data in/from database management application

Course Contents

Contents	**Hours**
Unit – 1	
Computer software : Introduction, Software definition, Software categories, Installing and uninstalling software, Software piracy, Software terminologies **Introduction to windows Operating System**, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, finding folders and files, System utilities.	12

MS-Office : Introduction, Office user interface, Microsoft office Components **MS-Word:** Introduction, Starting MS-Word, Microsoft word Environment working with word documents, working with text, working with tables checking spelling and grammar, adding graphs to the document, mail merge, header and footers, page numbers, protect the document, working with formatting tools.	
Unit – 2	
MS-Excel: Introduction, starting MS Excel, Microsoft Excel environment, Working with Excel workbook, Working with worksheet – Entering data, Excel formatting tips and Techniques, Generating graphs, Formulas and Functions, Inserting charts, Sorting , Pivot Tables, data extraction, adding clip art, add an image from a file, Printing in Excel .	10
Unit - 3	
MS-Power point- Starting MS–Power Point , Working with power point -, Creating, Saving and Printing a presentation, Working with Animation, Adding a slide to presentation, Navigating through a presentation, Slide-sorter, Slide-show, Editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video & Sound). **The Internet :** Basic internet terms, Internet applications, Internet tools, Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, Advantages and disadvantages of email.	10
Unit - 4	
Database fundamentals- Basic database terms, Database Management System **MS-Access:** Introduction to Access, Creating Tables and Database, Data Type and Properties, Adding & Deleting Field in Table, Primary Key Fields, Queries, Forms: The Forms wizard saving forms, Modifying forms, Pages, Macro, Module, Reports, Printing Report, Forms	10

Text Book:

1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition., Pearson

Reference Books:

1. Peter Norton, Introduction to Computers, 7th edition, Tata McGraw Hill Publication, 2011 2)
2. Anita Goel, Computer Fundamentals, Pearson Education, 2011.
3. Linda Foulkes, Learn Microsoft Office 2019: A comprehensive guide to getting started with Word, PowerPoint, Excel, Access, and Outlook, Packt Publishing Limited, 2020
4. Bittu Kumar, Mastering MS Office: Concise Handbook With Screenshots, V&S Publishers, 2017

Semester: II

Course Title: Data Structures using C

Course Code: **CACT 152**	**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, 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

Course Contents

Contents	Hours
Unit - 1	
Introduction to data structures: Introduction, Basic terminology; Elementary Data Organization, Data Structures, Data Structure Operations **Introduction to Algorithms, Preliminaries**: Introduction, Algorithmic notations, Control structure. **Recursion:** Definition; Recursion Technique Examples – Factorial, Fibonacci sequence, Towers of Hanoi. **Arrays:** Basic Concepts – Definition, Declaration, Initialisation, Operations on arrays, Types of arrays, Representation of Linear Arrays in memory, Traversing linear arrays, Inserting and deleting elements, Multidimensional arrays- Two Dimensional Arrays Representation of two- dimensional arrays, Sparse matrices. **Sorting**: Selection sort, Bubble sort, Quick sort, Insertion sort, Merge sort	12
Unit - 2	
Searching : Definition, Sequential Search, Binary search **Dynamic memory management:** 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 liked 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	10
Unit - 3	
Stacks: Basic Concepts –Definition and Representation of stacks- Array representation of stacks, Linked 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	10

stack in function calls. **Queues**: Basic Concepts – Definition and Representation of queues- Array representation of Queues, Linked representation of Queues, Types of queues - Simple queues, Circular queues, Double ended queues, Priority queues, Operations on queues	
Unit - 4	
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,; Array representation of binary tree, Traversal of binary tree- preorder, inorder and postorder traversal **Graphs**: Terminologies, Matrix representation of graphs; Traversal: Breadth First Search and Depth first search.	10

Text Books :

1. Seymour Lipschutz, Data Structures with C, Schaum's Outlines Series, Tata McGraw Hill, 2011
2. R. Venkatesan and S. Lovelyn Rose, Data Structures, First Edition: 2015, Wiley India Pvt. Ltd. Publications

Reference Books:

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures, Computer Science Press, 1982.
2. Aaron M. Tenenbaum , Data structures using C, First Edition, Pearson Education
3. Kamathane, Introduction to Data structures, Pearson Education , 2004
4. Y. Kanitkar, Data Structures Using C, Third Edition, BPB
5. Padma Reddy: Data Structure Using C, Revised Edition 2003, Sai Ram Publications.
6. Sudipa Mukherjee, Data Structures using C – 1000 Problems and Solutions, McGraw Hill

Education, 2007

Course Title: Object Oriented Programming with JAVA

Course Code: **CACT 153**	**Course Title: Object Oriented Programming with 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

Course Contents

Contents	**Hours**
Unit – 1	
Fundamentals of Object Oriented Programming: Introduction, Object Oriented Paradigm, Basic Concepts of OOP, Benefits and Applications of OOP. **Introduction to Java:** Java Features, Java Environment, Simple Java Program, Java Program Structure, Java Tokens, Java Statements, Java Virtual Machine.	

Java Programming Basics: Constants, Variables, Data Types, Declaration of variables, Giving values to the variable, Scope of variables, Symbolic constants, Type casting. **Operators and Expressions**: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operator, Increment and Decrement Operators, Conditional Operator, Special Operators, Mathematical functions. **Using I/O:** Byte streams and character streams, predefined streams, reading console input, reading characters, strings, writing console output. **Decision Making & Branching**: Simple **if** statement, **if..else** statement, nesting of if..else statement, the else..if ladder, the Switch statement.	12
Unit – 2	
Decision making & Looping -The **while** statement, the **do** statement, the **for** statement . Jumps in loops, Labelled loops. **Class & Objects** - Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The 'this' keyword, Overloading Methods, Using Objects as Parameters, Returning Objects, Recursion, Understanding 'static', Introducing 'final ', Using Command-Line Arguments, Varargs : Variable-Length Arguments **Arrays and Strings:** One dimensional arrays, Creating an arrays, Two dimensional arrays , Strings, Vectors, Wrapper classes.	10
Unit - 3	
Inheritance - Inheritance Basics, Using 'super', Creating Multilevel hierarchy, Method Overriding, Using Abstract Classes, Using final with Inheritance. **Packages & Interfaces** - Packages, Access protection in packages, Importing Packages, Interfaces. **Exception Handling** - Exception Handling Fundamentals – Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java's built-	10

in Exceptions	
Unit - 4	
Multithreaded Programming- Introduction, Creating threads, Extending the thread class, stopping & blocking thread, Life cycle of a thread, Using thread methods, Implementing the runnable interface. **Event and GUI programming:** The Applet Class, Types of Applets, Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repaint, The HTML APPLET tag. Event Handling - The delegation event model, Event Classes –ActionEvent, KeyEvent & MouseEvent Classes, Event Listener Interfaces –ActionListener, KeyListener & MouseListener interfaces. Using the Delegation Event Model. Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet. Creating a Windowed Program, Displaying information within a window. **Introducing swing** – two key swing features, components and containers, the swing packages, a simple swing application, event handling. Exploring Swing- Jlabel, JTextField, JButton, Checkboxes , Radio buttons , Jlist , JComboBox.	10

Text Books :

1. E Balagurusamy, Programming with Java – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
2. Herbert Schildt, Java : The Complete Reference, Seventh Edition, McGraw Hill Publication.

Reference Books:

1. Herbert Schildt, Java 2 - The Complete Reference, Fifth Edition, McGraw Hill publication.
2. Cay S. Horstmann, Core Java Volume I –Fundamentals, Prentice Hall.
3. Somashekara, M.T., Guru, D.S., Manjunatha, K.S, Object Oriented Programming with Java, EEE Edition, PHI.

Course Title: Discrete Mathematical Structures

Course Code: **CACT 151**	**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.
- Understand the concepts of various types of relations, partial ordering and equivalence relations.
- To understand the concept of probability and mathematical induction.
- Familiarize the fundamental concepts of graph theory and shortest path algorithm.
- To understand the concept of binary tree representation.

Course Contents

Contents	Hours
Unit - 1	
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, joint Daniel **Sets:** Definition, notation, inclusion and equality of sets, the power set, Operations on sets,Venn diagram, ordered pairs, and n-tuples, Cartesian product,	12

Relations: Introduction, properties of a binary relation in a set, Relation matrix and graph of a relation, equivalence relations, compatibility relations, composition of Binary relation	
Unit - 2	
Partial Ordering: Definition, lexicographic ordering, Partially ordered set, Hasse diagram, well- ordered set **Functions**: Definition and introduction, types of functions, composition of functions, inverse functions **Counting**: Basics of counting, Pigeonhole principle, Permutation and combination, Generalized Permutations and Combinations, generating permutation and combination, inclusion and exclusion	10
Unit - 3	
Discrete Probability: Introduction, finite probability, probabilities of complements and unions of events, probability theory, conditional probability, independence, random variables, Bayes' theorem, expected value and variance, independent random variable. **Mathematical Induction**: Mathematical Induction, principle of mathematical induction, proving inequalities, strong induction and well ordering **Number Theory**: Division algorithm, Modular arithmetic, primes and greatest common divisors, least common multiple, the Euclidean algorithm	10
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. **Trees**: Directed tree, leaf node, branch node, ordered tree, degree of a node, forest,	10

descendent, m-ary tree, conversion of directed tree into a binary tree.	

Text Books:

1. J.P. Trembley and R. Manobar, Discrete Mathematical Structures, McGraw Hill Education Private Limited, New Delhi,
2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, Seventh Edition, 2012.
3. Bernard Kolman, Robert C, Busby, Sharon Ross, Discrete Mathematical Structure, 2003.

Reference Books:

1. D C Sanchethi and V K Kapoor, Business Mathematics, Eleventh Revised Edition, Sulthan Chand & Sons Educational publishers, New Delhi,
2. Narsingh Deo, Graph Theory with Applications to Engg and Comp. Sci, PHI, 1986.
3. Ralph P. Grimaldi, B. V. Ramatta, Discrete and Combinatorial Mathematics, 5th Edition, Pearson, Education
4. K Chandrashekhara Rao, Discrete Mathematics, Narosa Publishing House, New Delhi

Course Title: Data Structures Lab

Course Code: CACP 151	**Course Title: Data Structures Lab**
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 20
Exam Marks: 30	Exam Duration: 03 Hours

Programming Lab

Part A:

1. Program to sort the given list using selection sort technique.
2. Program to sort the given list using insertion sort technique.
3. Program to sort the given list using bubble sort technique.
4. Program to search an element using linear search technique.
5. Program to search an element using binary search technique.
6. Program to implement Stack operations using arrays.
7. Program to implement Queue operations using arrays
8. Program to implement dynamic array. Find smallest and largest element.

Part B:

1. Program to sort the given list using merge sort technique.
2. Program to implement circular queue using array
3. Program to search an element using recursive binary search technique
4. Program to implement Stack operations using linked list.
5. Program to implement Queue operations using linked list.
6. Program to evaluate postfix expression.
7. Program to perform insert node at the end, delete a given node and display contents of singly linked list.

8. Menu driven program for the following operations on Binary Search Tree (BST) of Integers
   (a) Create a BST of N Integers
   (b) Traverse the BST in Inorder, Preorder and Post Order

Assessment Criteria		**Marks**
Program – 1 from Part A	Writing the Program	05
	Execution and Formatting	05
Program -2 from Part B	Writing the Program	07
	Execution and Formatting	08
Practical Record		05
Total		**30**

Evaluation Scheme for Lab Examination

Course Title: JAVA Lab

Course Code: CACP 152	**Course Title:** JAVA Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 20
Exam Marks: 30	Exam Duration: 04 Hours

Programming Lab

PART A

1.Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).

2.A menu driven program to input two integers & an operator to perform basic arithmetic operations (+ ,-,* and /) using switch case structure.

3. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits.(Hint Input 327 and 539 output 3x5+2x3+7x9=84)

4. Program to input Start and End limits and print all Fibonacci numbers between the ranges.(Use for loop) 5.Define a class named Pay with data members String name, double salary, double da, double hra, double pf,

double grossSal, double netSal and methods: Pay(String n, double s) - Parameterized constructor to initialize the data members, void calculate() - to calculate the following salary components, and void display() - to display the employee name, salary and all salary components.

Dearness Allowance = 15% of salary House Rent Allowance = 10% of salary Provident

Fund = 12% of salary

Gross Salary = Salary + Dearness Allowance + House

Rent Allowance Net Salary = Gross Salary - Provident

Fund

Write a main method to create object of the class and call the methods to compute and display the salary details. 6.Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the

data and a member function Sum ( ) to add two distances by using objects as method arguments and show the result. (Input and output of inches should be less than 12.)

7. Program to check whether the given array is Mirror Inverse or not.
8. Program to create a class "Matrix" that would contain integer values having varied numbers of columns for each row. Print row-wise sum.
9. Program to extract portion of character string and print extracted string. Assume that 'n' characters extracted starting from mth character position.
10. Program to add, remove and display elements of a Vector

PART-B

1. Create a class named 'Member' having data members: *Name, Age, PhoneNumber, Place and Salary.* It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inherit the 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same.
2. Program to implement the following class hierarchy: Student: id, name

   StudentExam (derived from Student): Marks of 3subjects, total marks StudentResult (derived from StudentExam) : percentage, grade

   Define appropriate methods to accept and calculate grade based on existing

criteria and display details of N students

3. Program to calculate marks of a student using multiple inheritance implemented through interface. Class **Student** with data members rollNo, name, String **cls** and methods to set and put data. Create another class **test** extended by class Student with data members mark1, mark2, mark3 and methods to set and put data. Create interface sports
   with members sportsWt = 5 and putWt(). Now let the class results extends class test and implements interface sports. Write a Java program to read required data and display details in a neat format.
4. Program to create an abstract class named shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Ellipse such that each one of the classes extends the class shape. Each one of the class contains only the method print Area() that print the area of the given shape.
5. Create a package to convert temperature in centigrade into Fahrenheit, and one more package to calculate the simple Interest. Implement both package in the Main () by accepting the required inputs for each application.
6. Program that implements a multi-threaded program has three threads. First thread generates a random integer every second, and if the value is even, second thread computes the square of the number and prints. If the value is odd the third thread will print the value of cube of the number.
7. 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.
8. Program that creates a user interface to perform basic integer operations. The user enters two numbers in the TextFields - Num1 and Num2. The result of operations must be displayed in the Result TextField when the "=" button is clicked. Appropriate Exception handling message to be displayed in the Result TextFieldwhen Num1 or Num2 is not an integer or Num2 is Zero when division operation is applied.
9. Program to accept the employee name, employee number and basic salary as inputs and find the gross and net salaries on the following conditions.

if Salary <= 20000 D.A is 40% Salary; H.R.A is 10% Salary.

P.F 12% of Gross; PT is Rs .100

if Salary > 20000 D.A is 50% of salary ; H.R.A 15% of salary

P.F 12% of Gross ; PT is Rs.150

Gross = basic salary +D.A +HRA and Net = Gross -PT –PF

10. Using the swing components, design the frame for shopping a book that accepts book code, book name, and Price. Calculate the discount on code as follows.

Code Discount

rate 101 15%

102 20%

103 25%

Any other 5%

Find the discount amount and Net bill amount. Display the bill.

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Program – 1 from Part A	Writing the Program	05
	Execution and Formatting	05
Program -2 from Part B	Writing the Program	07
	Execution and Formatting	08
Practical Record		05
Total		**30**

Course Code: CSOE 151	**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):

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

- Understand various Internet related terminologies
- Explain features and evolution of Internet
- Explain the use of search engines
- Know the use of different tags available in HTML
- Design web pages using HTML5, CSS3, XML and XHTML
- Implement websites using linked web pages.

Course Contents

Contents	**Hours**
Unit – 1	
The Internet: Introduction, Evolution, basic internet terms, Getting connect to internet, Internet applications, Data over the internet. **Internet tools:** Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, checking email, sending email, email attachment, How email works, advantages and disadvantages of email. **Search Engines:** Searching an internet, refining the search, Instant messaging, Features of messengers.	12
Unit – 2	

Overview of HTML5 -Exploring new features of HTML5, Structuring an HTML Document, Creating an saving HTML document, Viewing an HTML document. **Fundamentals of HTML-**Understanding Elements, Root elements, Metadata elements, Style element, Section element, Header and Footer element, Address element, Basic HTML data types, Data types defined by RFC and IANA Documentation. **Working with Text:** Formatting Text with HTML Elements, Defining MARK element, Defining STRONG element, Defining CODE element, Defining SMALL element. **Organizing Text in HTML:** Arranging text, Displaying Lists.	10
Unit - 3	
Working with Links and URLs- Exploring the Hyperlinks, Exploring the URL, Exploring Link Relations. **Creating Tables-**Understanding Tables, Describing the table element. **Working with Images, Colors and Canvas -** Inserting images in a web page, Exploring Colors, Introducing Canvas **Working with Forms:** Exploring Form element, Exploring types of the INPUT element, Exploring the BUTTON element, Exploring the Multiple-Choice elements, Exploring TEXTAREA and LABEL elements. **Working with Frames:** <FRAMESET>, <FRAME> tag with attributes.	10

Unit - 4	
Overview of CSS3- Understanding the syntax of CSS, Exploring CSS Selectors, Inserting CSS in an HTML document. **Background and Color Gradients in CSS:** Exploring Background of a Web Page, Exploring Color Properties, Exploring Gradient Properties, Exploring Font properties.	10

Working with Basics of XML-Exploring XML, Comparing XML with HTML, Describing the Structure of an XML document.	

Text Books

1. ITL Education Solution Limited, Introduction to Information Technology, Pearson Education, 2012
2. DT Editorial Services, HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Second Edition, Dreamtech Publisher, 2016

Reference Books

1. Laura Lemay & Rafe Colburn, Mastering Html, CSS & Javascript, Web Publishing, 2016
2. Firuza Aibara, HTML 5 for Beginners, 2012
3. Glenn Johnson, Training Guide – Programming in HTML5 with JavaScript and CSS3 (Microsoft Press Training Guide), 2013

Scheme of Assessment for Theory Examination

Duration: 3 Hrs

Max Marks: 60

<table>
<tr><th colspan="2">Question Pattern</th><th>Marks</th></tr>
<tr><td colspan="3">Part – A</td></tr>
<tr><td colspan="2">1. Answer any SIX sub-questions (6×2=12)</td><td rowspan="5">12</td></tr>
<tr><td>Sub-question</td><td>Unit</td></tr>
<tr><td>a, b</td><td>1</td></tr>
<tr><td>c, d</td><td>2</td></tr>
<tr><td>e, f</td><td>3</td></tr>
<tr><td>g, h</td><td>4</td></tr>
<tr><td colspan="3">Part – B
(Answer any ONE full question from each unit – 12 marks each)
(Combinations of sub-questions of 3 to 6 marks)</td></tr>
<tr><td colspan="2">Unit-1</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">2.</td></tr>
<tr><td colspan="2">3.</td></tr>
<tr><td colspan="2">Unit-2</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">4.</td></tr>
<tr><td colspan="2">5.</td></tr>
<tr><td colspan="2">Unit-3</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">6.</td></tr>
<tr><td colspan="2">7.</td></tr>
<tr><td colspan="2">Unit-4</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">8.</td></tr>
<tr><td colspan="2">9.</td></tr>
<tr><td colspan="2">Total</td><td>60</td></tr>
</table>

Open Electives in Computer Science

(For Students studying Core Courses other than Computer Science/ Computer Applications)

Sl. No	Open Electives in Computer Science
1	C Programming Concepts
2	Office Automation
3	Multimedia Processing
4	Python Programming Concepts
5	R Programming
6	E-Content Development
7	E-Commerce
8	Web Designing
9	Computer Animation
10	Accounting Package

Semester: III

Course Title: Database Management System	
Course code: CACT201	
Total Contact Hours: 42	Course Credits: 03+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Understand 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 design ER diagrams for given real-world problems.
- Represent ER model to relational model and its implementation through SQL.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Understand the transaction processing and concurrency control techniques.

Contents	Hours
Unit-1	
Database Architecture: Introduction to Database system applications. Characteristics, Data models, Database schema, Database architecture, Data independence, Database languages, GUIs, and Classification of DBMS. E-R Model: 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	11

ratio of a relationship. Weak entity types, E -R diagram.	
Unit-2	
Relational Data Model: Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. Data Normalization: Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form.	11
Unit-3	
INTERACTIVE SQL: Table fundaments, oracle data types, CREATE TABLE command, Inserting data into table, Viewing Data in the table, sorting data in a table, Creating a table from a table, Inserting data into a table from another table, Delete operations, Updating the contents of a table, Modifying the structure of tables, Renaming tables, destroying tables, displaying table structure. DATA CONSTRAINTS :Types of data constraints, IO constraints-The PRIMARY KEY constraint, The FOREIGN KEY constraint, The UNIQUE KEY constraint, Business Rule Constraints- NULL value concepts NOT NULL constraints, CHECK constraint, DEFAULT VALUE concepts. COMPUTATIONS ON TABLE DATA: Arithmetic Operators, Logical Operators, Range Searching, Pattern Matching, Oracle Table – DUAL, Oracle Function- Types, Aggregate Function, Date Conversion Function. GROUPING DATA FROM TABLES IN SQL, Group By clause, Having clause, subqueries, JOINS, Using the UNION, INTERSECTION, MINUS clause	10
Unit-4	

INTRODUCTION TO PL/SQL: Advantages of PL/SQL, The Generic PL/SQL Block, PL/SQL- The character set, Literals, PL/SQL datatypes, variables, Logical comparisons, Displaying User Messages on The VDU Screen, comments. Control Structure - Conditional Control, Iterative Control PL/SQL Transactions:Cursor-Types of Cursor, Cursor Attributes.Explicit cursor-Explicit cursor Management, cursor for loop PL/SQL Database Objects: Procedures and Functions, Oracle Packages, Error Handling in PL/SQL.	10

Text Book:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015

Reference Books:

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

Course Title: C# and Dot Net Framework	
Course code: CACT202	
Total Contact Hours: 42	Course Credits: 03+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Understand 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#.

Contents	**Hours**
Unit-1	
Introduction to .Net Technologies: Introduction to Web Technologies. HTML Basics, Scripts. Sample Programs. Advantages and Disadvantages of Client-side and Server- side Scripts. Overview of Client-side Technologies and Server-side Technologies. Introduction to C#: Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Control Structures-Methods, Arrays, Strings, Structures, Enumerations	11
Unit-2	
OOPS with C#: Classes, Objects, Inheritance, Polymorphism, Interfaces,	

Operator Overloading Delegates, Events, Errors and Exceptions. Introduction to VB.NET: Introduction, VB.NET -IDE – Start page, menu system, tool bars, New project dialog box, graphical designers, code designers, Intellisense, object browser, Toolbox, Solution explorer, property window, dynamic help window, component tray, server explorer, output window, task list, command window.	11
Unit-3	
VB.NET Language: Basic Keywords. Data Types. VB.NET statements. Conditional statements: If Else, Select Case, Switch and Choose Loops: Do, For Next, For Each Next, While loop. Arrays. Subroutines and Functions in VB.NET. Application Development on .NET: Vb.NET: Windows Forms. Working with Controls- Textbox, Label, Button Timer, Picture-box, Group-box, Listbox , Combo-box, Horizontal and Vertical Scrollbar, Numeric-up-down, Track-bar, and Progress-bar. Building Windows Applications using C#	10
Unit-4	
Data Access Connectivity: ADO.NET: Introduction to ADO.NET, ADO vs ADO.NET Architecture: Data reader, Data adopter, Accessing Data with ADO.NET. Binding Controls to Databases: Various ways to bind the data, simple binding, complex binding, binding data to control. Programming Web Applications with Web Forms. Web Controls in C#, ASP.NET applications with ADO.NET.	10

References:

1. "Programming in C#", E. Balagurusamy, 4th Edition, Tata McGraw-Hill, 2017.
2. “Visual Basic.NET”, Shirish Chavan, 3rd Edition, Pearson Education, 2009.
3. “ASP.NET and VB.NET Web Programming”, Matt J. Crouch, Edition 2012.
4. "Computing with C# and the .NET Framework", Arthur Gittleman, 2nd Edition, Jones & Bartlett Publishers, 2011

Course Title: Computer communication and networks	
Course code: CACT203	
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 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.

Contents	**Hours**
Unit-1	
Introduction: Uses of Computer Networks and its Applications: Business Applications, Home Applications, Mobile Users, Social Issues. Network Hardware-Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks. Reference Models-The OSI Reference Model, The TCP/IP Reference Model, A Comparison of the OSI and TCP Reference Models.	11
Unit-2	

The Physical Layer: Transmission Media- Twisted Pair, Coaxial Cable, and Fiber Optics. Wireless Transmission- Radio Transmission, Microwave Transmission, Infrared, Light Transmission. Multiplexing-Frequency division, time division, code division, Switching. The Data Link Layer: Data link layer design issues-Services Provided to the Network Layer, Framing, Error Control, and Flow Control. Error Detection and Correction-Error-Correcting Codes, Error –Detecting Codes. Elementary Data Link Protocols-An Unrestricted Simplex Protocol, A Simplex Stop-and-Wait Protocol for an Error-Free Channel, A Simplex Protocol for a Noisy Channel. Sliding Window Protocols –A One Bit Sliding Window Protocol, A Protocol Using Go back n, A Protocol using Selective Repeat.	11
Unit-3	
The Network Layer: Network layer design issues-Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram Networks. Routing Algorithms-Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Anycast Routing. Congestion Control Algorithms-Approaches to Congestion Control, Approaches to Congestion Control, Admission Control. The network layer in the Internet-The IP Version 4 Protocol, IP Address, IP Version 6, Internet Control Protocol, The Interior Gateway Routing Protocol: OSPF, The Exterior Gateway Routing Protocol: BGP.	10
Unit-4	
The Transport Layer: The Transport Service-Services Provided to the Upper Layers. Elements of Transport Protocols-Addressing, Connection Establishment, connection Release, Error control and Flow Control. The Internet Transport Protocols-(TCP and UDP)-UDP- Introduction to UDP, Remote Procedure Call,	

Real-Time Transport Protocols, TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management Modeling, TCP Sliding Window, The Application Layer: DNS – Domain Name System-The DNS Name Space, Domain Resource Records, Name Servers. Electronic Mail-Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The Word Wide Web- Architectural Overview,Static Web Pages, Dynamic Web Pages and Web Applications, HTTP—The HyperText Transfer Protocol	10

Text Book:

1. Computer Networks, Andrew S. Tanenbaum, 5th Edition, Pearson Education, 2010.

Reference Books:

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

Course Title: **DBMS Lab**	Course code: **CACP201**
Total Contact Hours: 52	Course Credits:02
Formative Assessment Marks: 25	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 25	

PART A

1. Create a table EMPLOYEE using SQL command to store details of employees such as EMPNO, NAME, DESIGNATION, DEPARTMENT, GENDER and SALARY. Specify Primary Key and NOT NULL constraints on the table. Allow only 'M' or 'F' for the column GENDER. DEPARTMENT can be SALES, ACCOUNTS, IT.
Choose DESIGNATION as CLERK, ANALYST, MANAGER, ACCOUNTANT and

SUPERVISOR that depends on department

Write the following SQL queries:

a. Display EMPNO, NAME and DESIGNATION of all employees whose name ends with RAJ.
b. Display the details of all female employees who is earning salary within the range 20000 to 40000 in SALES or IT departments.
c. List the different DEPARTMENTs with the DESIGNATIONs in that department.
d. Display the department name, total, average, maximum, minimum salary of the DEPARTMENT only if the total salary given in that department is more than 30000.
e. List the departments which have more than 2 employees.

2. Create a table CLIENT to store CLIENT_NO, NAME, ADDRESS, STATE, BAL_DUE. Client no must start with 'C'. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table.

Insert 10 records.

Write the following SQL queries:

a) From the table CLIENT, create a new table CLIENT1 that contains only CLIENT_NO and NAME , BAL_DUE from specified STATE. Accept the state during run time.
b) create a new table CLIENT2 that has the same structure as CLIENT but with no

records. Display the structure and records.

c) Add a new column by name PENALTY number (10, 2) to the CLIENT.
d) Assign Penalty as 10% of BAL_DUE for the clients C1002, C1005, C1009 and for others 8%. Display Records.
e) Change the name of CLIENT1 as NEW_CLIENT.
f) Delete the table CLIENT2.

3. Create a table BOOK using SQL command to store Accession No, TITLE, AUTHOR, PUBLISHER, YEAR, PRICE. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records.

Write the following SQL queries:

a) List the details of publishers having 'a' as the second character in their names.
b) Display Accession No., TITLE, PUBLISHER and YEAR of the books published by the specified author before 2010 in the descending order of YEAR. Accept author during run time.
c) Modify the size of TITLE to increase the size 5 characters more.
d) Display the details of all books other than Microsoft press publishers.
e) Remove the records of the books published before 1990.

4. Create a table SALES with columns SNO, SNAME, MANAGER_NAME, JOIN_DATE, DATE_BIRTH, SALARY,SALES_AMOUNT and COMMISSION. Minimum age for joining the company must be 18 Yrs. Default value for Commission should be 0. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records with data except commission.

Manager of Manager can be NULL.

Write the following SQL queries:

a) Display the details of Sales Persons whose salary is more than Average salary in the company.
b) Update commission as 20% of Sales Amount.
c) Display SNO, SNAME, MANAGER_NAME, SALARY, COMMISSION, MANAGER_SALARY of the sales persons getting sum of salary and commission more than salary of manager.(Self join)
d) Display the records of employees who finished the service of 10years.

5. Create a table Sales_Details with the columns SNO, MONTH, TARGET and QTY_SOLD to store the Sales Details of one year. Specify the composite primary key to the columns SNO and MONTH. TARGET and SALES must be positive numbers.

Write the following SQL queries:

a. Display the total sales by each sales person considering only those months sales where target was reached.
b. If a commission of RS.50 provided for each item after reaching target, calculate and display the total commission for each sales person.
c. Display the SNO of those who never reached the target.
d. Display the SNO, MONTH and QTY_SOLD of the sales persons with SNO S0001 or S0003

6. Create a table Bank with the columns ACNO, ACT_NAME, ACT_TYPE and BAL. Specify the Primary Key. Initial BAL must be greater than 500.

Write a PL/SQL program to perform debit operation by providing acct_no and amount required. The amount must be greater than 100 and less than 20000 for one transaction. If the account exist and BAL-amount>100 Bank table must be updated, otherwise "NO SUFFFICIENT BALANCE" message should be displayed. If account number is not present then display "NO SUCH ACCOUNT" message to the user.

7. Create a table STOCK_DETAIL with the columns PNO, PNAME and QTY_AVL to store stock details of computer accessories. Specify Primary Key and NOT NULL constraints on the table.

QTY_AVL should be positive number.

Write a PL/SQL Program to define a user defined exception named "LOW_STOCK" to validate the transaction. The program facilitates the user to purchase the product by providing product number and quantity required. It should display an error message "NO SUFFICIENT STOCK" when the user tries to purchase a product with quantity more than QTY_AVL, Otherwise the STOCK_DETAIL table should be updated for valid transaction.

PART B

1. Create the following tables by identifying primary and foreign keys. Specify the not null property for mandatory keys.
   SUPPLIERS (SUPPLIER_NO, SNAME, SADDRESS, SCITY)
   COMPUTER_ITEMS(ITEM_NO,SUPPLIER_NO,ITEM_NAME, IQUANTITY)

Consider three suppliers. A supplier can supply more than one type of items.

Write the SQL queries for the following

a. List *ITEM* and *SUPPLIER* details in alphabetical order of city name and in each city decreasing order of IQUANTITY.
b. List the name ,city,and address of the suppliers who are supplying keyboard.
c. List the supplier name, items supplied by the suppliers 'Cats' and 'Electrotech'.
d. Find the items having quantity less than 5 and insert the details of supplier and item of these, into another table NEWORDER.

2. Create the following tables identifying Primary and Foreign keys. Specify the not null property for mandatory keys.

EMPLOYEE_MASTER (EMP_ID, EMP_NAME, EMAIL_ID, EMP_ADDRS, PHONE)

A*TTENDANCE (EMP_ID, MONTH, WOM, MHRS, THRS, WHRS, TRHRS, FHRS, SHRS,*

SUHRS). (Valid values for WOM<=5, MONTH can be 1-12). Apply appropriate constraints. Consider 3 employees. And attendance records for at least two months.

Write the SQL queries for the following

a) Display *EMP_ID*,*EMP_NAME* and *EMAIL_ID* of all employees who are working on every Sunday of 2nd and 4th week in a month.
b) Display total hours worked by each employee in each month with EMP_ID.
c) Display the names of the employees who never attended the duty so far(Attendances not given so far).
d) Display the employee name, month, week, total hours worked for employees who have total no. of hours more than 20 hrs. a week.

3. Create the following tables by identifying primary and foreign keys, specify the not null property for mandatory keys.

PRODUCT_DETAIL				
P_NO	**PRODUCTNAME**	**QTYAVAILABLE**	**PRICE**	**PROFIT %**
P0001	Monitor	10	3000	20
P0002	Pen Drives	50	650	5
P0003	CD Drive	100	10	3
P0004	Key Board	25	600	10

PURCHASED_DETAIL		
CUSTNO	**P_NO**	**QTYSOLD**
C1	P0003	2
C2	P0002	4
C3	P0002	10
C4	P0001	3
C1	P0004	2
C2	P0003	2
C4	P0004	1

Write the following SQL queries:

a) Display total amount spent by C2.
b) Display the names of product for which either QtyAvailable is less than 30 or total QtySold is less than 5(USE UNION).
c) Display the name of products and quantity purchased by C4.
d) How much Profit does the shopkeeper gets on C1's purchase?
e) How many 'Pen Drives' have been sold?

4. Create table STUDENT_PROFILE includes Rollno, name, class, ECCC(Extra-Co curricular he belongs to such as SPORTs, NSS etc.) and another table MARKS_REPORT includes Rollno, Internal_Test, Marks1, Marks2, Marks3 and ECCC_marks.

Constraints

- Internal _Test can be either 1 or 2.
- Each mark can be 0-100. Absence in the test can be entered as -1.
- Consider atleast 3 classes.

Apply suitable data type and constraints to each column. Insert 5 students marks report in the both the tests.

Write the following SQL queries:

a) Find number of students failed class- wise.
b) Display the complete details of the students secured distinction(Percentage>=70) in I BCA.
c) Display class and highest total marks in second internals in each class.

d) Display the student name with rollno and class of those who passed in I internals and failed in II internals.(use SET operator)

5. Write a PL/SQL program to compute the selling price of books depending on the book code and category. Use Open, Fetch and Close.

The Book_detail table contains columns: Book Code, Author, Title, Category and Price. Insert 10 records.

Book Code	Category	Discount Percentage
A	Novels	10% of Price
	Technology	12.5% of Price
B	Commerce	18% of Price
	Science	19% of Price
C	Songs	25% of Price
	Sports	24% of Price
D	All	28% of Price

The selling price=Price-

Discount. The discount is

calculated as follows:

Print the result in tabular form with proper alignment

Book Code	category	author	price	discount %	discount	se
	title price	amount				ll
=====	=======	===== ====	=====	======	=====	

1. Write a PL/SQL program to display employee pay bill (using Cursor For loop) Use a **Procedure** to receive basic pay and to compute DA, HRA, Tax, PF, Gross Pay and Net Pay(Use OUT). Base table contains the following columns empnum, empname, basic pay.

Insert 3 records.

Allowances are computed as follows.

Basic Pay	DA	HRA
<=20000	35% of Basic	8% of Basic
>20000 & <=30000	38%	9%
>30000 & <=40000	40%	10%
>40000	45%	10%

Gross=Basic+DA+HRA

PF=12% of Gross or Rs. 2000 whichever is minimum. PT=Rs. 100 upto Gross is 25,000 else Rs. 200.

Net=Gross-(PF+PT) Print Pay slip as follows.

```
================PAYSLIP==================
Empno              :10011          Empname : Raj
Basic Pay          :20000             P.F.: 3432
DA                 :7000             P.T.: 200
H.R.A.             :1600
Gross              :28600        Net Pay : 24968
*************************************************
================PAYSLIP==================
Empno              :10012          Empname : Rani
Basic Pay          :30000             P.F.: 5292
DA                 :11400             P.T.: 200
H.R.A.             :2700
Gross              :44100        Net Pay : 38608
*************************************************
```

2. Given the following tables:

ITEM_MASTER(itemno, name, stock, unit_price) [Apply the Primary key and check constraint for stock and price as >0] [Insert 5 records]

ITEM_TRANS(itemno, quantity and trans_date)

Create a **package** PCK_ITEM includes a function CHK_ITEM and a procedure PROC_ITEM. **Function** CHK_ITEM gets one argument itemno and is used to check whether the parameter itemno exists in ITEM_MASTER and should return 1 if exist. Otherwise 0 and displays proper message.

Procedure PROC_ITEM gets two arguments itemno and quantity, and is used to perform the following if item exists. If required quantity is not available, give appropriate message. If available , insert a record of this transaction to ITEM_TRANS and modify the stock in ITEM_MASTER.

Write a PL/SQL program to accept ITEM_NO and Quantity needed of required item. Use Package to do the transaction process(Transaction date can be current date).

OUTPUT to be shown as follows:

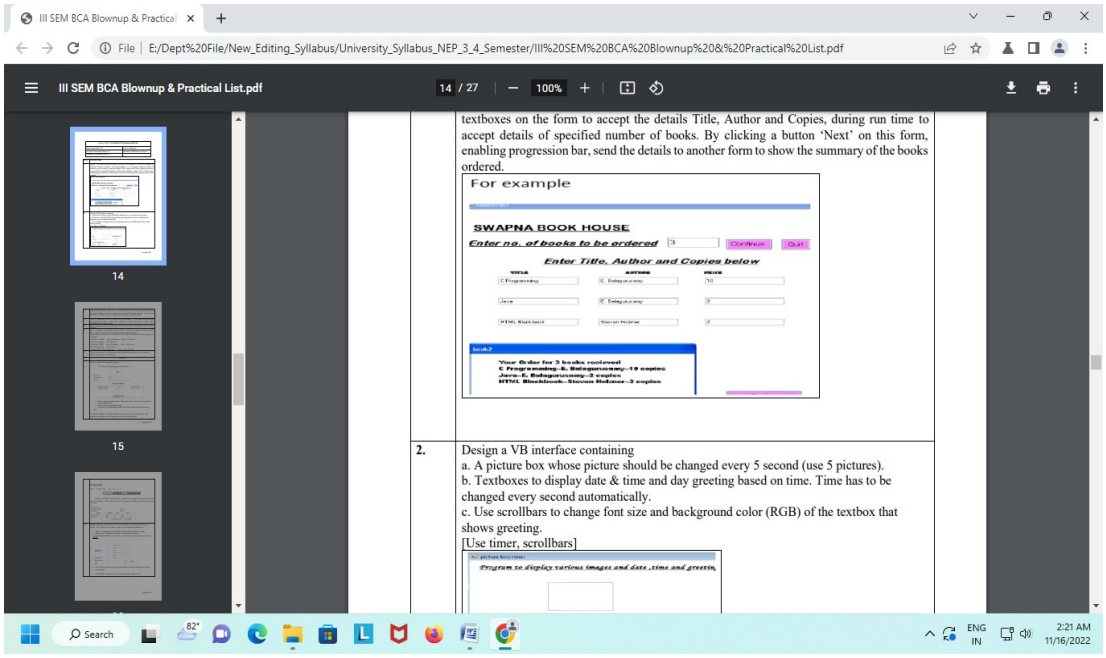
```
Enter value for accept_itemno: 1
old   5:            X:=&accept_itemno;
new   5:            X:=1;
Enter value for quantity: 3
old   6:          M:=&quantity;
new   6:          M:=3;
Item :aa   Quantity  :3  Price  :15 Total Amount  :45
```

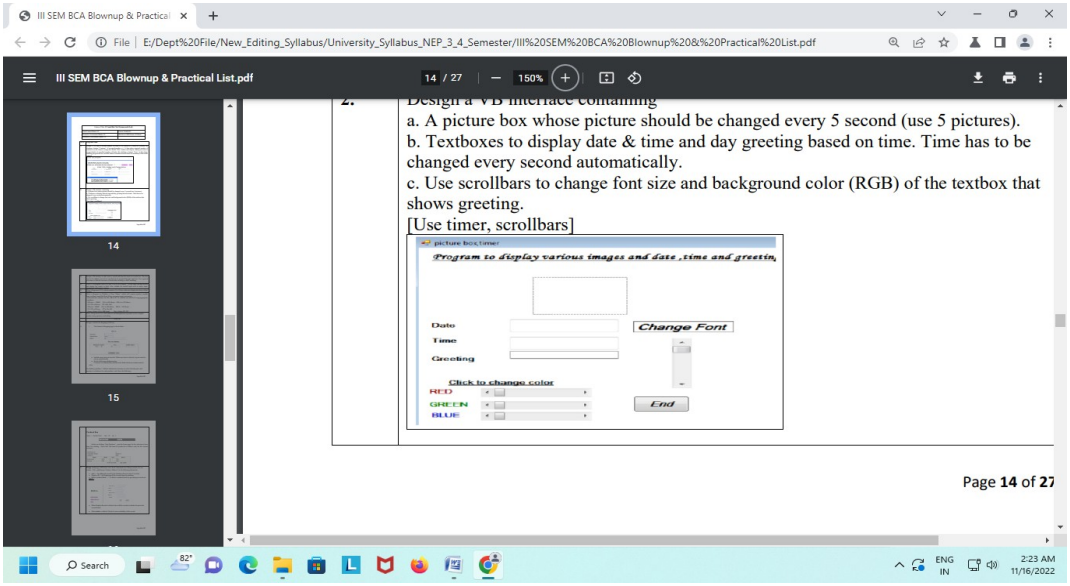
Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	PART-A Writing:4 Marks Execution:4Marks	8 Marks
Program-2	PART-B Writing:6 Marks Execution:6Marks	12 Marks
Practical Record		05 Marks
Total		25 Marks

Course Title: **C# and Dot Net Framework Lab** **Course code: CACP 202**	
Total Contact Hours: 52	Course Credits:02
Formative Assessment Marks: 25	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 25	

Sl.No	**Program Name**
1.	Design a VB form to accept number of books to be ordered to a shop in a textbox. By clicking a button 'Continue', if accepted number is > 0, then place required number of textboxes on the form to accept the details Title, Author and Copies, during run time to accept details of specified number of books. By clicking a button 'Next' on this form, enabling progression bar, send the details to another form to show the summary of the books ordered.



2.	Design a VB interface containing a. A picture box whose picture should be changed every 5 second (use 5 pictures). b. Textboxes to display date & time and day greeting based on time. Time has to be changed every second automatically. c. Use scrollbars to change font size and background color (RGB) of the textbox that shows greeting. [Use timer, scrollbars] 
3.	Design a VB interface to add, remove, search and clear the items in a combo box. The item name to be added, removed or searched can be accepted through input box. Use a general procedure to find the existence of item before deleting or while searching.
4.	Write a VB program find GCD and LCM of two number.. Accept input through textbox and display the results in label. Also validate for invalid input such as empty input, nonnumeric and negative integer.
5.	Write a Program in C# to checka number if it is Prime; otherwise display the factor of that number.
6.	Write a Program in C#define a Class “Salary” which will contain member variable Emp_no,Emp_name,Dob Basic Write a program using constructor. And method to calculate the DA, HRA, PF, IT, GROSS and NETPAY using appropriate condition. If Basic <= 20000 D.A is 40% Basic H.R.A is 10% Basic. P.F 12% of Gross; PT is Rs .100

	If Basic.> 20000 D.A is 50% Basic. H.R.A 15% Basic. P.F 12% of Gross ; PT is Rs.150 Gross = Basic.+D.A +HRA and Net = Gross -PT –PF
7.	Write a Program in C# to find addition and Multiplication operation on two complex number using operator overloading.
	PART-B

1.	Design a website for shopping.(ASP.net) i. The format of shopping page is show below. **ABC Co.** Customer no :2 Customer Name :xdsfvcd Address :dsfs ***Have a nice shopping...*** Item(click for selection) Price : Quantity required : Mouse 300 1 PURCHASE Reset ● Include many items in item list. When any item is selected, its price must be shown automatically. ● Do the following validations also. Customer no and Quantity should not be blank and must contain numeric value. On clicking ‘purchase’, Add the information customer no, item selected, price and quantity to a database for each purchase and show the following.

Purchased Item

item no :2 item name :Mouse Rate.....:300 qty.....:1

In this on clicking 'Next Purchase' , goto the home page for the selection of next item. On clicking 'Show bill' bill must be produced as follows only for the current customer.

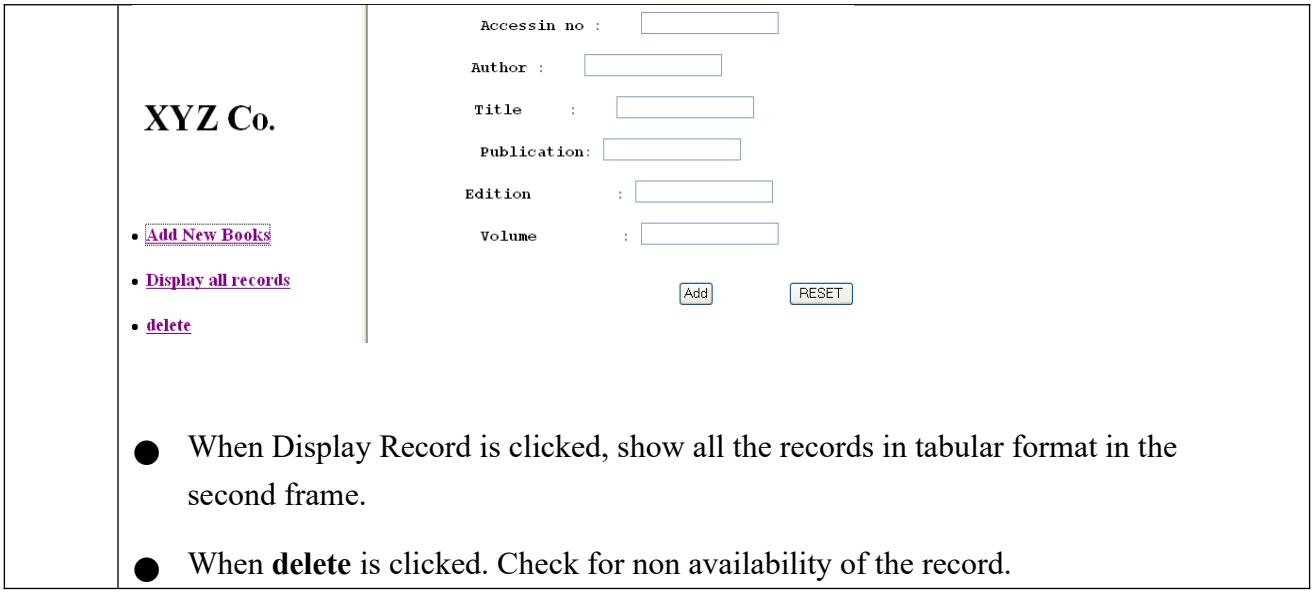
customer no :2
Customer Name :xdsfvcd
Address :dsfs

Item	Rate	Qty	Price
Keyboard	400	2	800
Mouse	300	1	300
		Total Amount	:Rs.1100

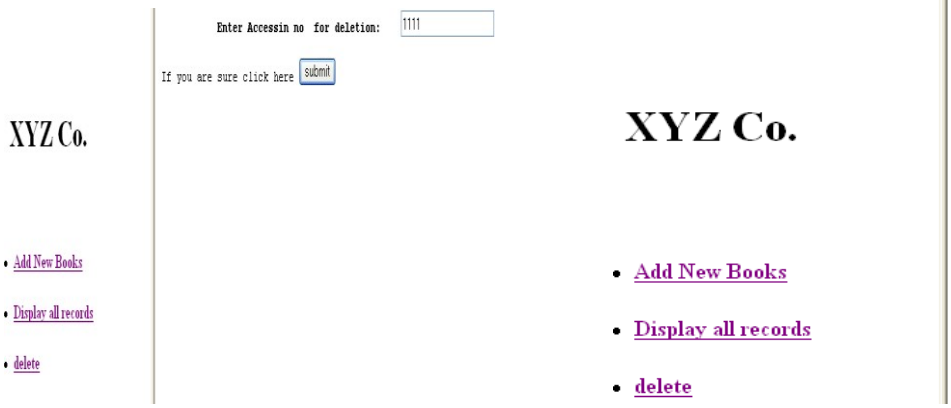
2 **Design a we**bpage (ASP.net)to enter Book information in a library such as Acc.no, Author , Title , publication, Volume, Edition. Use the following buttons for,

- Add -> for adding the record to the database (Insert at least 5 records).
- Display All -> for displaying all the records from the database
- Delete outdated Book -> To delete a outdated book by specifying accession no.

HINT :



- When Display Record is clicked, show all the records in tabular format in the second frame.
- When **delete** is clicked. Check for non availability of the record.



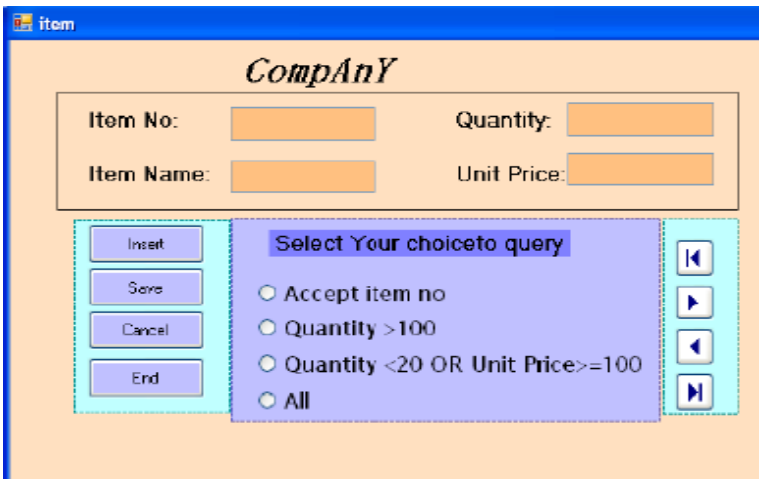
3. Create a table item contains Item no, name, quantity in stock and unit price.

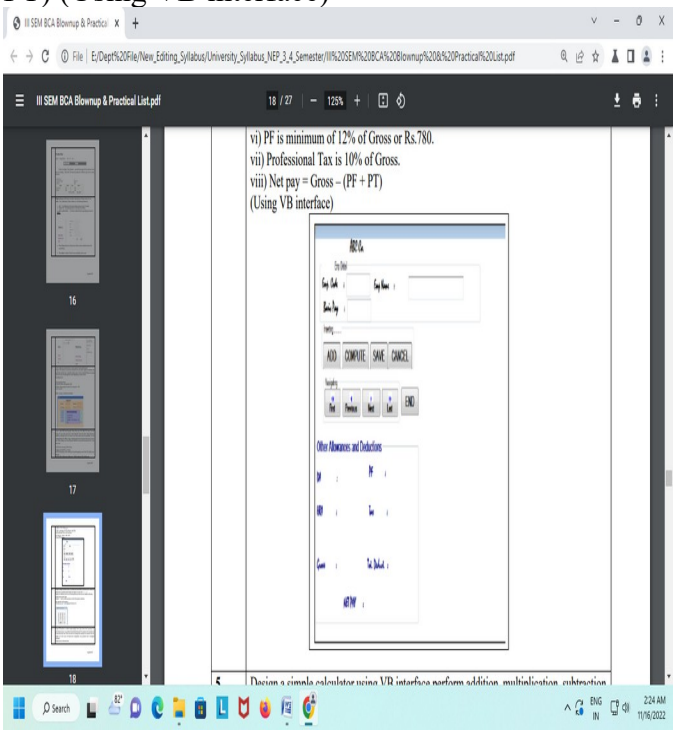
Design a VB interface to enter the records and save to the table. Apply the validation rule for quantity and price for +ve numbers and non-zero. Use the command buttons to navigate (first, next, prev, last) through the records depending on search criteria.

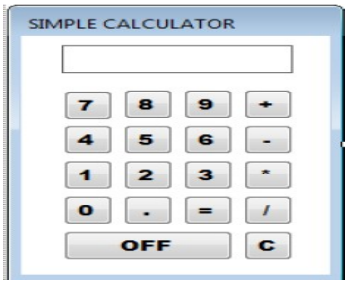
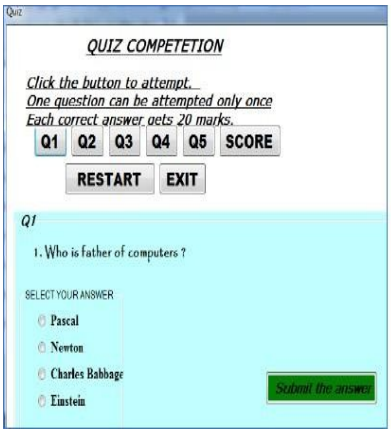
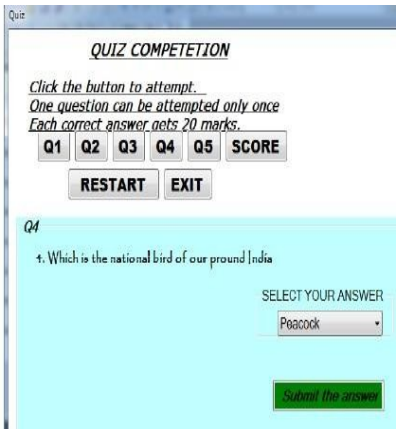
Searching can be

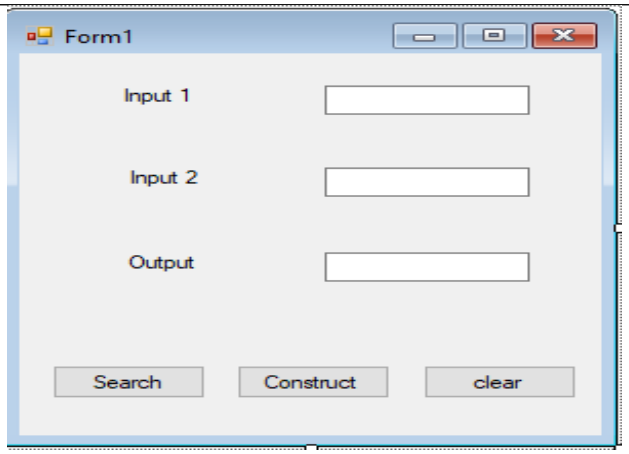
i) By accepting item no.
ii) Only the items with quantities>100
iii) Items either quantity less than 20 or unit price>=100
iv) To view all.

While viewing it, should not be editable.



4.	Create a table EMP with Empcode, Name, Basic pay, DA, HRA, PF, Gross, Tax and Netpay. Set up a data entry form to input Empcode, name and salary. Other allowances should be calculated and to be shown on the form which cannot be modifiable. Use the command button for adding, saving, computing and various navigation (first, next, previous, last). While adding, new record Empcode should be incremented automatically by 1 from last record. i) All data are necessary while saving. ii) Basic pay should be +ve integer. iii) While navigating, if the control goes beyond beginning or end of the file, display error message. iv) DA is 40% of Basic pay if Basic pay > 20000, otherwise 30% of Basic pay.
	v) HRA is 10% of Basic pay. vi) PF is minimum of 12% of Gross or Rs.780. vii) Professional Tax is 10% of Gross. viii) Net pay = Gross – (PF + PT) (Using VB interface) 
5.	Design a simple calculator using VB interface perform addition, multiplication, subtraction and division. It should contain buttons for digits 0-9, clear, dot, =, +, –, *, /. Apply the validation rules to avoid entering dot more than once in a number and using – symbol between the digits. Symbol '–' can be used as operator as well as for negative

	numbers. Any operand can be negative. "Division by zero" to be displayed if divisor is 0. 
6.	Design VB interface to conduct simple multiple choice Quiz with at least 5 questions. For selecting the answers, use combo box and radio buttons for few questions. One question can be answered only once. Show the total score through the message box whenever the user wishes to see his score in between the competition. Any question can be attempted randomly. Design can be as shown below.
	 
7	



Create a ASP .NET web application with the above interface and if user clicks on "Search" button then following operation has to be done,

From the Given two strings (from input1 and input2), return a new string, following the rules given below.

If string b occurs in string a, then the new string should concatenate the characters that appear before and after of String b.Ignore cases where there is no character before or after the word, and a character may be included twice if it is in between two string b's.

Example1)

i/p) abcdefcdhycd,cd o/p) befhy Example2)

i/p) kumarkumar,kum o/p) ara

If user clicks on "Construct" button then following operation has to be performed from

Given two strings print a new string which is made of the following combination-first character of a, the first character of b, second character of a, second character of b and so on. Any characters left will go to the end of the result.

Example1) i/p:Hello,World o/p:Hweolrllod

in both the operation output should be displayed in output text box and clear button should clear all the text boxes.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	PART-A Writing:4 Marks Execution:4Marks	8 Marks
Program-2	PART-B Writing:6 Marks Execution:6Marks	12 Marks
Practical Record		05 Marks
Total		25 Marks

Semester: IV

Course Title: Python Programming	
Course code: CACT251	
Total Contact Hours: 42	Course Credits: 03+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

a. Explain the basic concepts of Python Programming.
b. Demonstrate proficiency in the handling of loops and creation of functions.
c. Identify the methods to create and manipulate lists, tuples and dictionaries.
d. Discover the commonly used operations involving file handling.
e. Interpret the concepts of Object-Oriented Programming as used in Python.
f. Develop the emerging applications of relevant fields using Python.

Contents	Hours
Unit-1	
Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. Python Basics: Identifiers; Keywords; Statements and Expressions; 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. Python Control Flow: Types of Control Flow; Control Flow Statements- if, else,	11

elif, while loop, break, continue statements, for loop Statement; range () and exit () functions. Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally. Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions	
Unit-2	
Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifies; Escape Sequences; Raw and Unicode Strings; Python String Methods. Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists. Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries. 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.	11
Unit-3	
File Handling: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator. Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition,	10

Private Instance Variables; Polymorphism- Definition, Operator Overloading. GU Interface: The tkinter Module; Window and Widgets; Layout Management- pack, grid and place	
Unit-4	
Python SQLite: The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on TablesInsert, Select, Update. Delete and Drop Records. Data Analysis: NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Pandas- Introduction to Pandas, Series and DataFrames, Creating DataFrames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on DataFrames. Data Visualisation: Introduction to Data Visualisation; Matplotlib Library; Different Types of Charts using Pyplot- Line chart, Bar chart and Histogram and Pie chart	10

References:

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

Learning and Information LLC, 2021.

9. http://www.ibiblio.org/g2swap/byteofpython/read/
10. https://docs.python.org/3/tutorial/index.html

Course Title: Python Programming Lab	Course code: **: CACP251**
Total Contact Hours: 52	Course Credits: 02
Formative Assessment Marks: 25	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 25	

PART-A

1. Write a program create list with N elements. find all unique elements in the list. If an element is found only once in the list then add that element to the unique list.
2. Program using user-defined functions to find the area of rectangle square circle and triangle by accepting suitable input parameters from user.
3. Consider a tuple t1= (1 2 5 7 9 2 4 6 8 10). Write a program to perform following operations:
   a. Print half the values of tuple in one line and the other half in the next line.
   b. Print another tuple whose values are even numbers in the given tuple.
   c. Concatenate a tuple t2= (11 13 15) with t1.
   d. Return maximum and minimum value from this tuple.
4. Write a function that takes a sentence as input from the user and calculates the frequency of each letter. Use a variable of dictionary type to maintain the count.
5. Write a program to create a text file and compute the number of characters words and lines in a file.
6. Program using user defined exception class that will ask the user to enter a number until he guesses a stored number correctly. To help them figure it out a hint is provided whether their guess is greater than or less than the stored number using user defined exceptions.

PART B

1. Program to create a class Employee with empno name depname designation age and salary and perform the following function.
   i) Accept details of N employees
   ii) Search given employee using empno
   iii) Display employee details in neat format.
2. Write a program menu driven to create a BankAccount class. class should support the following methods for i) Deposit ii) Withdraw iii) GetBalanace . Create a subclass SavingsAccount class that behaves just like a BankAccount but also has an interest rate and a method that increases the balance by the appropriate amount of interest.
3. Create a GUI to input Principal amount rate of interest and number of years Calculate Compound interest. When button submit is pressed Compound interest should be displayed in a textbox. When clear button is pressed all contents should be cleared.
4. Write a GUI program to implement Simple Calculator
5. Create a table student table (regno name and marks in 3 subjects) using MySQL and perform the followings
   a. To accept the details of students and store it in database.
   b. To display the details of all the students
   c. Delete particular student record using regno.
6. Create a table employee (empno name and salary) using MySQL and perform the followings
   a. To accept the details of employees and store it in database.
   b. To display the details of a specific employee
   c. To display employee details whose salary lies within a certain range

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	PART-A Writing:4 Marks Execution:4Marks	8 Marks
Program-2	PART-B Writing:6 Marks Execution:6Marks	12 Marks
Practical Record		05 Marks
Total		25 Marks

Course Title: **Computer Multimedia and Animation**	
Course code: CACT252	
Total Contact Hours: 42	Course Credits: 03+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 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.

Contents	Hours
Unit-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, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The and tags; Overview and features of CSS3. JavaScript: Object orientation and JavaScript; General syntactic characteristics;	11

Primitives, operations, and expressions; Screen output and keyboard input.	
Unit-2	
Animation: Introduction, 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.	11
Unit-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	10
Unit-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, 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.	10

References:

1. The Complete Reference HTML and CSS, 5th Edition, Thomas A Powell, 2017.
2. Animation in HTML, CSS, and JavaScript, KirupaChinnathambi, 1st Edition, 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: **CACT203**
Total Contact Hours: 52	Course Credits: 02
Formative Assessment Marks: 25	Duration of SEE/Exam: 03 Hours
Summative Assessment Marks: 25	

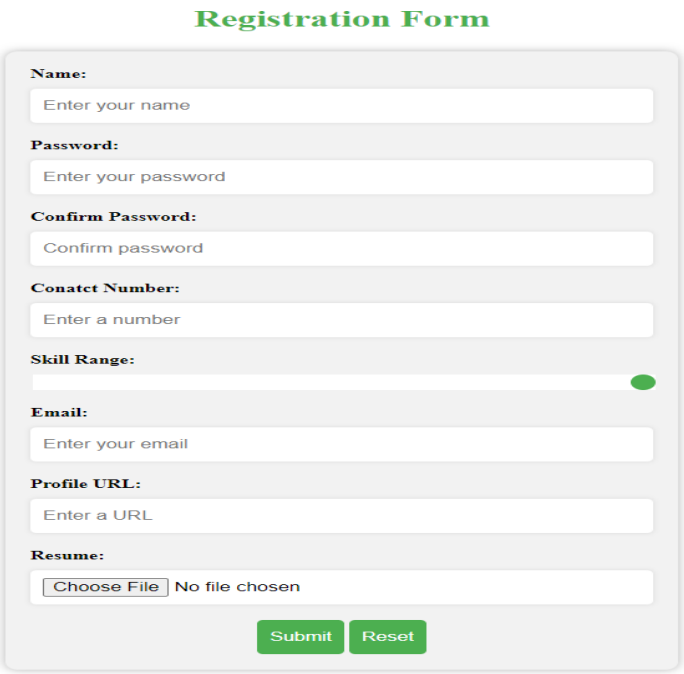
PART-A

1. Create a home page for a college website containg all latest HTML5 tags like <article> <aside> <nav> <header> <footer> <section> <figure>. And in

<nav>. Create hyper links for courses facilities and contact details. On clicking

- Course hyperlink display the page with course names offered in the college using ordered list
- Facilities hyperlink display the page describing the facilities using unordered list
- Contact hyperlink display the page to show phone number email and address in separate columns with respective headings.

2. Design a HTML5 web page containing form with text password number range email url file submit and reset elements which must be styled using CSS3 according to following screen shot.

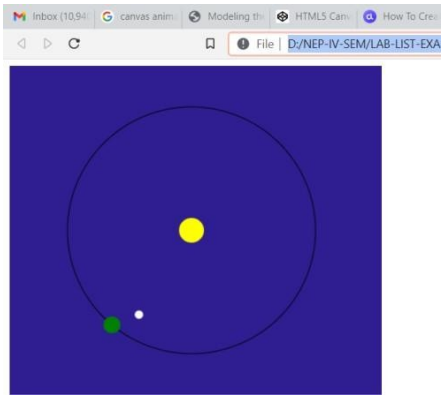


Note that:

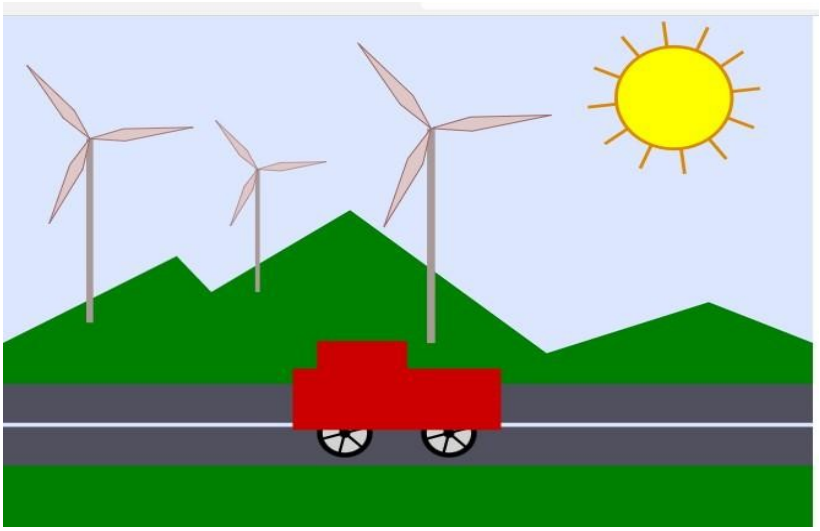
- Apply the style exactly same as shown in the above screen shot (with border radius box shadow and colours).
- Submit and Reset buttons must change their colour on mouse hovering.
- Name and passwords should not be empty. If empty provide error message when **submit** is clicked .
- When clicked on submit button email Profile URLs must be validated for proper input.
- Contact number must contain only 10 digits not lesser and not more.
- Clicking on Reset button must clear all fields' entry.

3. Create an HTML5 web page which shows a smiling face initially. On every click of 'Toggle Face' button display should toggle between smiling face and sad face.
Note: Use only one button. And faces should be drawn using canvas element. Faces must be exactly like the following screen shots.

1. Create a web page to model solar system using canvas element animation where it contains sun earth and moon (all must be created using canvas shapes not images). Earth should revolve around sun and moon should revolve around earth simultaneously. Sample screen shot below:



2. Create the following drawing in html page using only SVG.



4. Create a web page using HTML and CSS to create a timetable as follows:

COLLEGE TIME TABLE

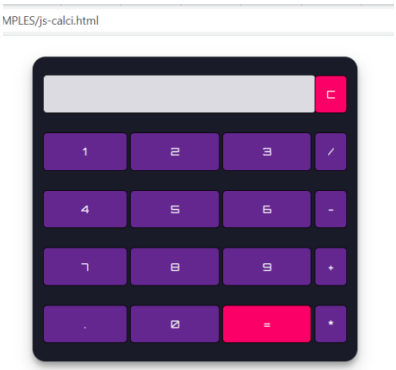
	8:30-9:30	9:30-10:30	10:30-11:30	11:30-12:30	12:30-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MONDAY	---	SUB1	SUB2	SUB3	LUNCH	SUB4	SUB5	COUNSELLING CLASS
TUESDAY	SUB1	SUB2	SUB3	---		SUB2	SUB2	LIBRARY
WEDNESDAY	SUB1	SUB2	SWA	---		LAB		
THURSDAY	SUB1	SUB2	SUB3	---		SUB2	SUB2	LIBRARY
FRIDAY	SUB1	SUB2	SUB3	---		SUB4	SUB5	LIBRARY
SATURDAY	SUB1	SEMINAR				SUB4	SUB5	LIBRARY

PART-B

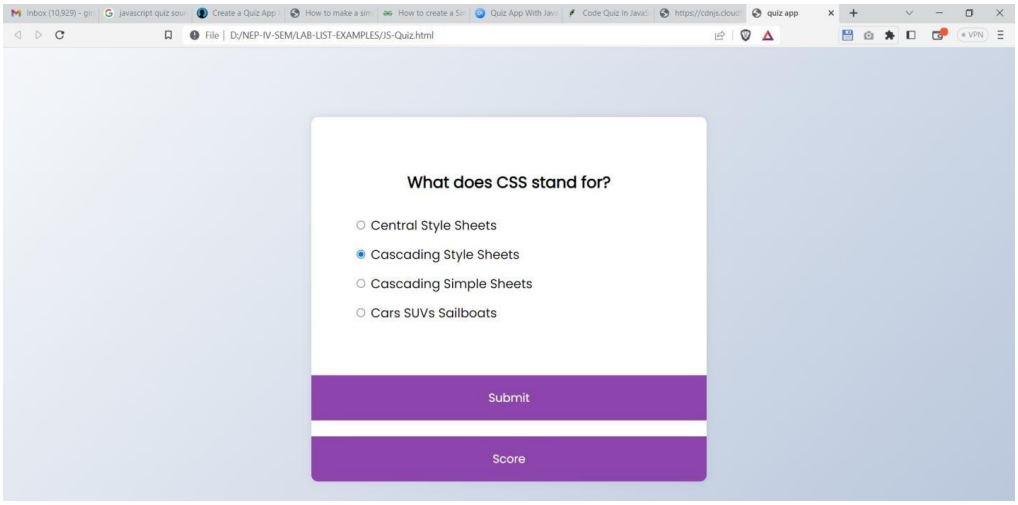
1. Create a web page using HTML5 canvas element to show a clock which changes time for every second minute and hours (as that of an analog clock). Clock should have second minute and hour needles and minute marking must be there (as shown in screen shot).

2. Create a web page containing simple calculator which should have basic arithmetic (+ - * /) operation on two floating point numbers and show result.
Validations to be followed:

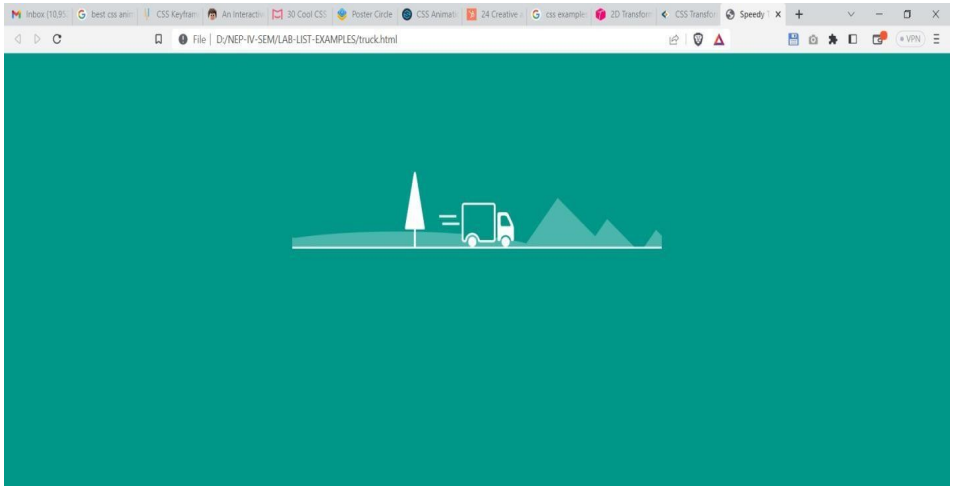
- . (Decimal point) should be taken only once for an operand.
- Operand can be negative.
- Division by zero must be shown proper error message in result. Sample screen shot:



3. Create a HTML page make a quiz game where user should answer one question at a time answers must be shown in radio buttons. Without submitting the answer quiz should not move to next question (Minimum five questions must be there). When user wishes to get score (using score button) score should be displayed in alert message. All the question must be loaded in same page (no page navigation is allowed) Sample screen shot:



4. Create a web page using HTML5/CSS3 to animate a truck movement. While truck moves on mountains and trees should move in the back ground. Output screen shot:

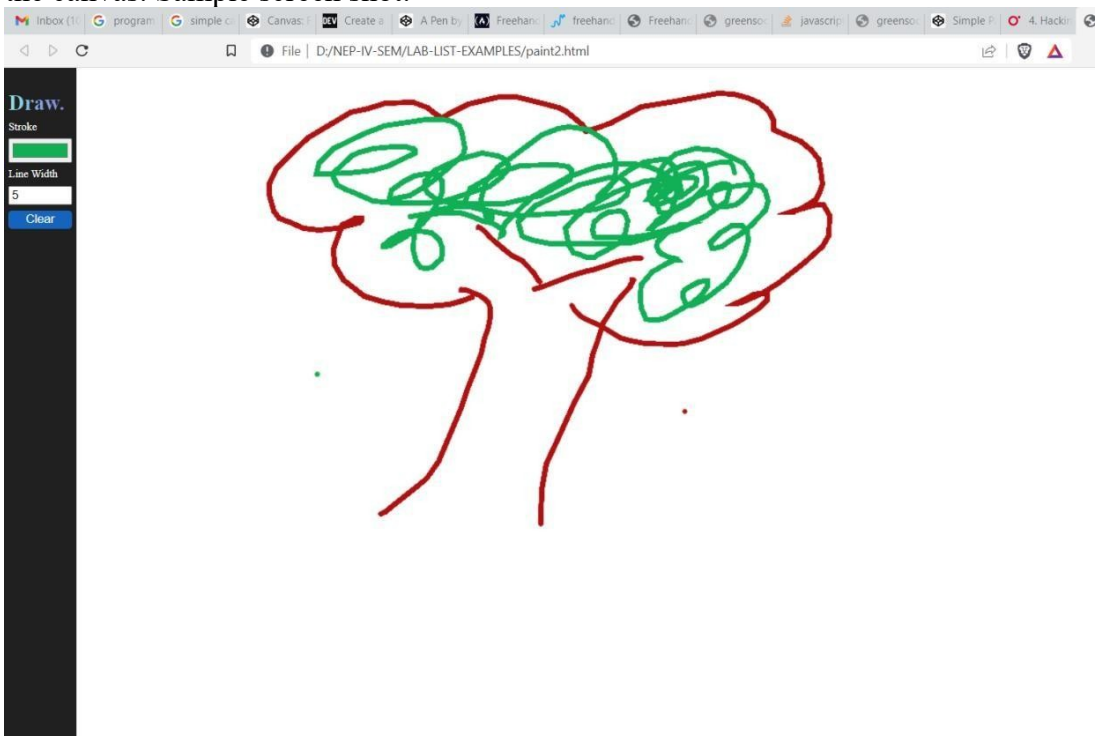


Background hills must be created using CSS only and for tree truck and wheels download the images from the following URLs.

https://s3-us-west-2.amazonaws.com/s.cdpn.io/130015/tree.svg https://s3-us-west-2.amazonaws.com/s.cdpn.io/130015/truck.svg
https://s3-us-west-2.amazonaws.com/s.cdpn.io/130015/wheels.svg

Animation must be implemented using ONLY CSS and Java script should not be used.

5. Create a simple paint app which draws lines based on the selected colour (chosen using color input) with selected thickness (chosen using number input) and there must be CLEAR button to clear the canvas. Sample screen shot:



6. Create web page using HTML5 canvas element to illustrate all canvas composition. Output must exactly look like the following screenshot:

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	PART-A Writing:4 Marks Execution:4Marks	8 Marks
Program-2	PART-B Writing:6 Marks Execution:6Marks	12 Marks
Practical Record		05 Marks
Total		25 Marks

Course Title: **Operating System Concepts**	
Course code: CACT253	
Total Contact Hours: 42	Course Credits: 03
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Understand 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.

Contents	Hours
Unit-1	
Introduction to Operating System: Definition, History and Examples of Operating System; Types of Operating Systems; Functions of Operating System; Systems Calls; Operating System Structure. File System: File Concepts- Attributes, Operations and Types of Files; File System; File Access methods; Directory Structure; Protection; File System Implementation- File System Structure, Allocation Methods, Free Space Management.	10

Unit-2	
Memory Management: Logical and Physical Address Space; Swapping; Contiguous Allocation; Paging; Segmentation; Segmentation with Paging. Virtual Memory: Introduction to Virtual Memory; Demand Paging; Page Replacement; Page Replacement Algorithms; Allocation of frames, Thrashing Disk Scheduling (I/O Management): Introduction and Scheduling Algorithm	10
Unit-3	
Process Management: Process Concept- Process Definition, Process State, Process Control Block, Threads; Process scheduling- Multiprogramming, Scheduling Queues, CPU Scheduling, Context Switch; Operations on Processes- Creation and Termination of Processes; Inter process communication (IPC)- IPC Implementation Methods- Shared Memory and Message Passing; CPU Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling; Multiprocessor Scheduling; Real-Time CPU Scheduling	11
Unit-4	
Process Synchronization: Introduction; Race Condition; Critical Section Problem and Peterson's Solution; Synchronization Hardware, Semaphores; Classic Problems of Synchronization- Readers and Writers Problem, Dining Philosophers Problem; Monitors. Deadlocks: System Model; Deadlocks Characterization; Methods for Handling Deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection; and Recovery from Deadlock. Multithreaded Programming: Introduction to Threads; Types of Threads;	11

Multithreading- Definition, Advantages; Multithreading Models; Thread Libraries; Threading Issues.	

Text Book:

1. Operating System Concepts, Silber schatz' et al., 10thEdition, Wiley, 2018.

Reference Books:

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, Dhamdhere, 3rd Edition, McGraw Hill Education India.
6. Modern Operating Systems, Andrew S Tanenbaum, 4th Edition, Pearson

Scheme of Assessment for Theory Examination

Duration: 3Hrs

Max Marks: 60

<table>
<tr><th colspan="2">Question Pattern</th><th>Marks</th></tr>
<tr><td colspan="3">Part–A</td></tr>
<tr><td colspan="2">1.Answer any SIX sub-questions (6×2=12)</td><td rowspan="5">12</td></tr>
<tr><td>Sub-question</td><td>Unit</td></tr>
<tr><td>a, b</td><td>1</td></tr>
<tr><td>c, d</td><td>2</td></tr>
<tr><td>e, f</td><td>3</td></tr>
<tr><td>g, h</td><td>4</td></tr>
<tr><td colspan="3">Part–B
(Answer any ONE full question from each unit–12 marks each)
(Combinations of sub-questions of 3 to 6marks)</td></tr>
<tr><td colspan="2">Unit-1</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">2.</td></tr>
<tr><td colspan="2">3.</td></tr>
<tr><td colspan="2">Unit-2</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">4.</td></tr>
<tr><td colspan="2">5.</td></tr>
<tr><td colspan="2">Unit-3</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">6.</td></tr>
<tr><td colspan="2">7.</td></tr>
<tr><td colspan="2">Unit-4</td><td></td></tr>
</table>

8.	**12**
9.	
Total	**60**

Open Electives in Computer Science

(For Students studying Core Courses other than Computer Science/ Computer Applications)

Sl. No	**Open Electives in Computer Science**
1	C Programming Concepts
2	Office Automation
3	Multimedia Processing
4	Python Programming Concepts
5	R Programming
6	E- Content Development
7	E- Commerce
8	Web Designing
9	Computer Animation
10	Accounting Package

Program Name	**BCA**	Semester	**V**
Course Title	**Design And Analysis of Algorithms (Theory)**		
Course Code:	CACT 301	No. of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- CO1. Understand the fundamental concepts of algorithms and their complexity, including time and space complexity, worst-case and average-case analysis, and Big-O notation.
- CO2. Design algorithms for solving various types of problems, such as Sorting, Searching, and Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques.
- CO3. Analyze and compare the time and space complexity of algorithms with other algorithmic techniques.
- CO4. Evaluate the performance of Sorting, Searching, Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques using empirical testing and benchmarking, and identify their limitations and potential improvements.
- CO5. Apply various algorithm designs to real-world problems and evaluate their effectiveness and efficiency in solving them.

Unit	Description	Hours
1	**Introduction:** What is an Algorithm? Fundamentals of Algorithmic problem solving, Important Problem Type Fundamentals of Data Structures,Fundamentals of the Analysis of Algorithm Efficiency, Analysis Framework, Measuring the input size, Units for measuring Running time, Orders of Growth, Worst-case, Best-case and Average-case efficiencies. **Asymptotic Notations and Basic:** Efficiency classes, Informal Introduction, O-notation, Ω-notation, θ-notation, mathematical analysis of non-recursive algorithms, and mathematical analysis of recursive algorithms.	**13**
2	**Brute Force & Exhaustive Search:** Introduction to Brute Force approach, Selection Sort and Bubble Sort, Sequential search- -Closest-Pair and Convex-Hull Problems by Brute Force, Exhaustive Search - Travelling Salesman Problem and Knapsack Problem.	**13**
3	**Decrease-and-Conquer:** Introduction, Insertion Sort, Depth First Search, Breadth First Search Topological Sorting. **Divide-and-Conquer:** Introduction, Merge Sort, Quick Sort, Binary Search, Binary Tree traversals and related properties, Multiplication of large Integers and Strassen's Matrix Multiplication.	**13**
4	**Greedy Technique:** Introduction, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees, Lower-Bound Arguments, Decision Trees, P Problems, Challenges of Numerical Algorithms.	**13**

Text Books:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 2nd Edition, 2009, Pearson.

References:

1. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014,

Universities Press.

2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
3. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)
4. Weblinks and Video Lectures (e-Resources):
   http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS43.html
   https://nptel.ac.in/courses/106/101/106101060/
   http://elearning.vtu.ac.in/econtent/courses/video/FEP/ADA.html http://cse01- iiith.vlabs.ac.in/
   http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the algorithms.															
Describe the analysis of algorithm efficiency using different notations.															
Discuss various problems using Brute force technique.															
Describe various problems using Divide and-Conquer Technique.															
Describe various problems using Decrease-and-Conquer.															

Discuss Greedy Techniques.															
Devise an algorithm using appropriate design strategies for problem solving.															
Estimate the computational complexity of different algorithms.															
Demonstrate the hardness of simple NP- complete problems.															

Program Name	**BCA**	Semester	**V**
Course Title	**Design and Analysis of Algorithms Lab**		
Course Code:	CACT P301	No. of Credits	**02**
Contact hours	04 Hours per week	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Note: Programs implementation using Java or Python

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:4 Marks Execution:4Marks**	**8 Marks**
Program-2	**PART-B** **Writing:6 Marks Execution:6Marks**	**12 Marks**
Practical Record		**05 Marks**
Total		**25 Marks**

Program Name	**BCA**	Semester	**V**
Course Title	**Statistical Computing & R Programming (Theory)**		
Course Code:	CACT 302	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- CO1. Explore fundamentals of statistical analysis in R environment.
- CO2. Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- CO3. Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- CO4. Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
- CO5. Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Unit	Description	Hours
1	Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices and Arrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Basic Plotting.	**13**
2	Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand- alone statement with illustrations in exercise, stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility. Basic Data	**13**

	Visualization.	
3	**Descriptive Statistics:** Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median, Percentiles, Quartiles, Measures of Variability, Mean Absolute Deviation Range, Inter-Quartile-Range, Standard Deviation, Z- Scores. Coefficient of Variation, Measure of shaper-Skewness and Kurtosis, Bar Chart, Pie Chart and Box Plot, Histogram, Frequency Polygon, Stem and Leaf Diagram. **Probability, Probability and Sampling Distribution:** Methods of assigning probability, Structure of probability, Marginal, union, joint and conditional probabilities. Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal	**13**
	Distribution, Uniform Distribution. Estimating the population mean using the and t-distribution.	
4	**Statistical Inference and Hypothesis Testing:** Types of Hypothesis, and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t-Test, One Sample Proportion Test, Paired Sample t-Test, Independent Samples t-Test, Two Sample Proportion Tests, One Way Analysis of Variance and Chi Square Test. **Correlation and Regression:** Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Karl Pearson Coefficient of Correlation, Correlation Matrix, Scatter Plots, Simple Regression Analysis.	**13**

Text Books:

1. Tilman M. Davies, “The book of R: A first course in programming and statistics”, San

Francisco, 2016.

2. Ken Black, Business Statistics, New Delhi, Wiley, 2013.

References:

1. Vishwas R. Pawgi, "Statistical computing using R software", Nirali prakashan publisher, e1 edition, 2022.
2. https://www.youtube.com/watch?v=KlsYCECWEWE
3. https://www.geeksforgeeks.org/r-tutorial/
4. https://www.tutorialspoint.com/r/index.html

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes(COs)/ProgramOutcomes(POs)	**Program Outcomes(POs)**														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Explore fundamentals of statistical analysis in R environment.															
Describe key terminologies, concepts and techniques employed in Statistical Analysis.															
Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.															
Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.															
Understand, Analyse, and Interpret															

Correlation Probability and Regression to analyse the underlying relationships between different variable															

Program Name	**BCA**	Semester	**V**
Course Title	R Programming Lab		
Course Code:	CACP 302	No.of Credits	**02**
Contact hours	04 Hours per week	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:4 Marks Execution:4Marks**	**8 Marks**
Program-2	**PART-B** **Writing:6 Marks Execution:6Marks**	**12 Marks**
Practical Record		**05 Marks**
Total		**25 Marks**

Program Name	**BCA**	Semester	**V**
Course Title	**Software Engineering (Theory)**		
Course Code:	CACT 303	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- CO1 How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.
- CO2 An ability to work in one or more significant application domains.
- CO3 Work as an individual and as part of a multidisciplinary team to develop anddeliver quality software.
- CO4 Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
- CO5 Demonstrate an ability to use the techniques and tools necessary for engineering practice.

Unit	Description	Hours
1	**OVERVIEW:** Introduction; Professional and ethical responsibility; Software process models; Process Iteration; Process activities; The Rational Unified Process; Agile Software Development: Agile methods; Plan- driven and agile development. **REQUIREMENTS ENGINEERING:** Functional and non-functional requirements; Software requirements document; Requirement's specification; Requirements engineering processes; Requirement's elicitation and analysis; Requirement's validation; Requirements	13

	management	
2	**SYSTEM MODELS:** Context Models; Behavioral models- Data Flow Models, State Machine Models; Data Models; Object Models: Inheritance models, object aggregation, object behavior modeling, Structured methods.	13
3	**ARCHITECTURAL DESIGN**: Architectural design decisions; System Organization-The repository model, The layered model, The Client– server model; Modular decomposition styles. **DESIGN AND IMPLEMENTATION:** An Object-Oriented Design Process- System context and models of use, Architectural design, Object identification, Design models, Object Interface specification; Design Patterns.	13
4	**A STRATEGIC APPROACH TO SOFTWARE TESTING:** Verification and Validation, Unit testing, Integration Testing, Regression testing, Smoke Testing, Alpha and Beta Testing, System testing, Component testing, Release testing; Test Case Design, Test Automation.	13

Text Books:

1. Ian Somerville-Software Engineering 8th Edition,Pearson Education,2009
2. Roger S. Pressman, "A Practitioners Approach",7th Edition, McGraw-Hill, 2007.

References Books:

1. Waman S Jawadekar-Software Engineering Principles and Practice,Tata McGrawHill,2004
2. P Jalote, "An Integrated Approach to software Engineering", Narosa Publication.

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/

Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) /Program Outcomes (POs)	Program Outcomes(POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
How to apply the software Engineering life cycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.															
An ability to work in one or more significant application domains.															
Work as an individual and as part of a multi disciplinary team to develop and deliver quality software.															
Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software life cycle.															
Demonstrate an ability to use the techniques and tools necessary for engineering practice.															

Program Name	**B.C.A**	Semester	**V**
Course Title	**Cloud Computing (Theory)**		
Course Code:	CACT 304	No.of Credits	**03**
Contact hours	**42 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

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

- CO1 Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- CO2 Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost.
- CO3 Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
- CO4 Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit	Description	Hours
1	**Introduction:** Different Computing Paradigms- Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Computing Basics- What is Cloud Computing? History, Characteristic Features, Advantages and Disadvantages, and Applications of Cloud Computing; Trends in Cloud Computing; Leading Cloud Platform Service Providers.	**10**
2	**Cloud Architecture:** Cloud Service Models- Infrastructure as a	**10**

	Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models- Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Cloud Computing Architecture- Layered Architecture of Cloud. Virtualization- Definition, Features of Virtualization; Types of Virtualizations- Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples- Xen: Paravirtualization, VMware: Full Virtualization, Microsoft Hyper-V.	
3	**Cloud Application Programming and the Aneka Platform:** Aneka Cloud Application Platform- Framework Overview, Anatomy of the Aneka Container; Building Aneka Clouds (Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode); Cloud Programming and Management- Aneka SDK (Application Model and Service Model); Management Tools (Infrastructure, Platform and Application management).	**10**
4	**Cloud Platforms in Industry:** Amazon Web Services- Compute Services, Storage Services, Communication Services, Additional Services; Google AppEngine- Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations; Microsoft Azure- Azure Core Concepts (Compute, Storage, Core Infrastructure and Other Services), SQL Azure, Windows Azure Platform Appliance. **Cloud Applications:** Scientific Applications- Healthcare (ECG	**12**

	Analysis in the Cloud) Biology (Protein Structure Prediction and Gene Expression Data Analysis for Cancer Diagnosis), Geoscience (Satellite Image Processing); Business and Consumer Applications- CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.	

Text Books:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering CloudComputing- Foundations and Applications Programming", Elsevier, 2013

References Books:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering CloudComputing- Foundations and Applications Programming", Elsevier, 2013
2. 2 Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
3. K Chandrashekaran: "Essentials of Cloud Computing", CRC Press, 2015
4. Derrick Rountree, Ileana Castrillo: "The Basics of Cloud Computing", Elsevier, 2014

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the Cloud Computing.															
Discuss about Cloud Application															

Programming and the Aneka Platform.															
Discuss about various Cloud Architecture.															
Study about AWS.															

Program Name	**B.C.A**	Semester	**V**
Course Title	**Digital Marketing (Theory)**		
Course Code:	CACV 301	No.of Credits	**03**
Contact hours	**42 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

CO1. Understand the fundamental concepts and principles of digital marketing.

CO2. Develop practical skills to implement various digital marketing strategies and techniques Co3. Analyze and evaluate the effectiveness of digital marketing campaigns.

CO4. Apply critical thinking and problem-solving skills to real-world digital marketing scenarios. CO5. Create comprehensive digital marketing plans and strategies.

Unit	Description	Hours
1	**Introduction to Digital Marketing:** Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms Digital Marketing Strategy and Planning: Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation. Campaign planning and execution, Monitoring and adjusting digital marketing campaigns	**10**
	Social Media Marketing: Overview of social media marketing,	**10**

2	Social media platforms and their features, Creating and optimizing social media profiles, Social media content strategy, Social media advertising and analytics	
3	**Email Marketing:** Introduction to email marketing, Building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics Content Marketing: Understanding content marketing, Content strategy and planning, Content creation and distribution, Content promotion and amplification, Content marketing metrics and analytics	**11**
4	**Mobile Marketing:** Mobile marketing overview, Mobile advertising strategies, Mobile app marketing, Location-based marketing, Mobile marketing analytics **Analytics and Reporting:** Importance of analytics in digital marketing, Setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization	**11**

Text Books:

1. "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth.

References

1. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by Chad S. White
2. "Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi
3. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles
4. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-

Observe- Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the Digital Marketing.															
Describe the issues of Mobile Marketing efficiency using different notations.															
Discuss various problems in Social Media Marketing.															
Describe various fundamentals of Social Media Marketing.															
Describe various problems using Mobile Marketing															
Discuss Email Marketing.															

Program Name	**BCA**	Semester	**V**
Course Title	**Employability skills**		
Course Code:	**SEC-4** **SBES 301**	No.of Credits	**03**
Contact hours	**48 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Program Name	**BCA**	Semester	**VI**
Course Title	**Artificial Intelligence and Applications**		
Course Code:	CACT 351	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

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

- Gain a historical perspective of AI and its foundations.
- Become familiar with basic principles and strategies of AI towards problem solving
- Understand and apply approaches of inference, perception, knowledge representation, and learning.
- Understand the various applications of AI

Unit	Description	Hours
1	**Introduction-** What is Artificial Intelligence, Foundations of AI, History, AI - Past, Present and Future. Intelligent Agents-Environments- Specifying the task environment, Properties of task environments, Agent based programs-Structure of Agents, Types of agents- Simple reflex agents, Model-based reflex agents, Goal-based agents; and Utility-based agents.	**13**
2	**Problem Solving by Searching**-Problem-Solving Agents, Well-defined problems and solutions, examples Problems, Searching for Solutions, Uninformed Search Strategies-Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search,	**13**

	Iterative deepening depth-first search, Bidirectional search, Greedy best-first search, A* Search, AO* search Informed (Heuristic) Search Strategies, Heuristic Functions	
3	**Knowledge Representation** - Knowledge-Based Agents, The Wumpus World , Logic, Propositional Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic, First-Order Logic-Syntax and Semantics of First-Order Logic, Using First-Order Logic, Unification and Lifting Forward Chaining, Backward Chaining.	**13**
4	**Learning**– Forms of Learning, Supervised Learning, Machine Learning - Decision Trees, Regression and Classification with Linear Models, Artificial Neural Networks, Support Vector Machines	**13**
	Applications of AI - Natural Language Processing, Text Classification and Information Retrieval, Speech Recognition , Image processing and computer vision, Robotics	

Text Books:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson Education, 2003

References

1. Tom Mitchell, "Machine Learning", 1st Edition, McGraw-Hill,2017
2. Elaine Rich, Kevin Knight, Shivashankar B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition,

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/

Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Develop systems that process unstructured, uncurated data automatically using artificial intelligence (AI) frameworks and platforms.															
Determine the framework in which AI bots may function, including interactions with users and environments.															
Design and implement cognitive automation fordifferent industries.															
Describe various problems using Searching-Problem Technique.															
Devise an algorithm using appropriate design strategies for problem solving.															

Program Name	**B.C.A**	Semester	**VI**
Course Title	**PHP & MySQL**		
Course Code:	CACT 352	No.of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes: After the successful completion of the course, the student will be able to:

CO1. Design dynamic and interactive web pages and websites.

CO2. Run PHP scripts on the server and retrieve results.

CO3. Handle databases like MySQL using PHP in websites.

Unit	Description	Hours
1	**Introduction to PHP**: Introduction to PHP, History and Features of PHP, Installation & Configuration of PHP, Embedding PHP code in Your Web Pages, Understanding PHP, HTML and White Space, Writing Comments in PHP, Sending Data to the Web Browser, Data types in PHP, Keywords in PHP, Using Variables, Constants in PHP, Expressions in PHP, Operators in PHP.	**13**
2	**Programming with PHP**: Conditional statements: if, if-else, switch, The ? Operator, Looping statements: while Loop, do-while Loop, for Loop Arrays in PHP: Introduction- What is Array?, Creating Arrays, Accessing Array elements, Types of Arrays: Indexed v/s Associative arrays, Multidimensional arrays, Creating Array, Accessing Array, Manipulating Arrays, Displaying array, Using Array Functions, Including and Requiring Files- use of	**13**

	Include() and Require(), Implicit and Explicit Casting in PHP.	
3	**Using Functions , Class- Objects, Forms in PHP**: Functions in PHP, Function definition, Creating and invoking user-defined functions, Formal parameters versus actual parameters, Function and variable scope, Recursion, Library functions, Date and Time Functions Strings in PHP: What is String?, Creating and Declaring String, String Functions **Class &Objects in PHP:** What is Class & Object, Creating and accessing a Class &Object, Object properties, object methods, Overloading, inheritance, Constructor and Destructor Form Handling:	**13**
4	**Creating HTML Form**, Handling HTML Form data in PHP **Database Handling Using PHP with MySQL**: Introduction to MySQL: Database terms, Data Types.Accessing MySQL –Using MySQL Client and Using php MyAdmin, MySQL Commands, Using PHP with MySQL: PHP MySQL Functions, Connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Counting Returned Records, Updating Records with PHP	**13**

Text Books:

1. PHP & MySQL for Dynamic Web Sites- Fourth Edition By Larry Ullman.

References

1. Learning PHP, MySQL and JavaScript By Robin Nixon –O"REILLY Publications
2. Programming PHP By Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre
3. SAMS Teach Yourself PHP in 24 hours, Author: Matt Zandstra, Sams Publishing

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-

Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the PHP.															
Problem solving using PHP.															
Discuss various OOPS concepts in PHP.															
Discuss the Database Conectivity in PHP.															
Study about Query handling in MySQL															
Discuss PHP forms.															

Program Name	**B.C.A**	Semester	**VI**
Course Title	**PHP and MySQL Lab**		
Course Code:	CACP351	No.of Credits	**02**
Contact hours	**4 Hours per week**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:4 Marks Execution:4Marks**	**8 Marks**
Program-2	**PART-B** **Writing:6 Marks Execution:6Marks**	**12 Marks**
Practical Record		**05 Marks**
Total		**25 Marks**

Program Name	**B.C.A**	Semester	**VI**
Course Title	**Fundamentals of Data Science (Theory)**		
Course Code:	**DSE-E2**	No.of Credits	**03**
Contact hours	**42 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

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

- Understand the concepts of data and pre-processing of data.
- Know simple pattern recognition methods
- Understand the basic concepts of Clustering and Classification
- Know the recent trends in Data Science

Unit	Description	Hours
1	**Data Mining**: Introduction, Data Mining Definitions, Knowledge Discovery in Databases (KDD) Vs Data Mining, DBMS Vs Data Mining, DM techniques, Problems, Issues and Challenges in DM, DM applications.	**11**
2	**Data Warehouse**: Introduction, Definition, Multidimensional Data Model, Data Cleaning, Data Integration and transformation, Data reduction, Discretization	**11**
3	**Mining Frequent Patterns**: Basic Concept — Frequent Item Set Mining Methods -Apriori and Frequent Pattern Growth (FPGrowth) algorithms -Mining Association Rules	**10**

4	**Classification:** Basic Concepts, Issues, And Algorithms: Decision Tree Induction. Bayes Classification Methods, Rule-Based Classification, Lazy Learners (or Learning from your Neighbours), k Nearest Neighbour. Prediction - Accuracy- Precision and Recall **Clustering**: Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering	**10**

Text Books:

1. Jiawei Han and Micheline Kambar – "Data Mining Concepts and Techniques" Second Edition
2. Arun K Pujari – "Data Mining Techniques" 4th Edition, Universities Press 3
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson Education, 2012.
4. K.P.Soman, Shyam Diwakar, V.Ajay: Insight into Data Mining – Theory and Practice, PHI 5
5. Pang-Ning Tan, Michael Steinbach, Vipin Kumar - "Introduction to Data Mining", Pearson Education

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the Data Mining.															
Describe the various models of Data Mining..															
Discuss about Classification Algorithms.															
Discuss Clustering Algorithms.															

Program Name	**B.C.A**	Semester	**VI**
Course Title	**Mobile Application Development (Theory)**		
Course Code:	CACE 351	No.of Credits	**03**
Contact hours	**42 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

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

- Create Servlets for server side programming Create, test and debug Android application by setting up Android development environment
- Critique mobile applications on their design pros and cons,
- Program mobile applications for the Android operating system and understand techniques for designing and developing sophisticated mobile interfaces
- Deploy applications to the Android marketplace for distribution.

Unit	Description	Hours
1	**Android OS design and Features**: Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools, Building your First Android application.	**11**
2	**Android Application Design Essentials**: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent	**11**

	Filter, Permissions.	
3	**Android User Interface Design Essentials**: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation. Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.	**10**
4	**Using Common Android APIs:** Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Deploying Android Application to the World.	**10**
	Text Books: 1. Lauren Darcey and Shane Conder , "Android Wireless Application Development", Pearson Education, 2nd ed. (2011) 2. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd 3. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd 4. Android Application Development All in one for Dummies by Barry Burd, Edition: I 5. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013 6. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012	

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discuss the fundamentals of the Mobile Application.															
Describe the Android tool kit.															
Design the Andriod User Interface.															
Discuss about Common Android APIs.															

Program Name	**B.C.A**	Semester	**VI**
Course Title	**Web Content Management System (Theory)**		
Course Code:	CACV 351	No. of Credits	**03**
Contact hours	**42 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

CO1. Understand content development basics

CO2. Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting

CO3. Host websites and develop content for social media platforms such as wiki and blog. CO4. Understand e-publications and virtual reality

CO5. Use of e-learning platform Moodle and CMS applications Drupal and Joomla

Unit	Description	Hours
1	Web Content Development and Management, Content Types and Formats, Norms and Guidelines of Content Development, Creating Digital Graphics, Audio Production and Editing.	**11**
2	Web Hosting and Managing Multimedia Content, Creating and Maintaining a Wiki Site. Presentation Software Part I, Presentation Software Part II, Screen casting Tools and Techniques, Multilingual Content Development.	**11**
	Planning and Developing Dynamic Web Content Sites, Website Design Using CSS Creating and Maintaining a WIKI Site, Creating and	**10**

3	Managing a Blog Site,	
4	E- Publication Concept, E- Pub Tools, Simulation and Virtual Reality Applications, Creating 2D and 3 D Animations. Introduction to Moodle ,Creating a New Course and Uploading, Create and Add Assessment, Add and Enroll User and Discussion Forum, Content Management System: Joomla, Content Management System: Drupal	**10**
	Text Books: 1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane Barker. 2. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko. 3. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko. 4. Using Joomla!: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia **Additional Reading:** **https://onlinecourses.swayam2.ac.in/cec20_lb09/preview**	

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) /	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1

Program Outcomes (POs)										0	1	2	3	4	5
Discuss the fundamentals of the Web Content Development and Management															
Understanding the role of content management technologies to acquire, organize and present web content.															
Understanding and exploring methods, tools and applications for content management.															
Understanding the knowledge cycle: acquisition, storing, application and maintenance															
Understanding key terms about semantic web, knowledge management and content management technologies															

Program Name	**B.C.A**	Semester	**VI**
Course Title	**Internship**		
Course Code:	**SEC-5**	No.of Credits	**02**
Contact hours	**30 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**30**

GUIDELINES FOR CONDUCTING INTERNSHIP:

Internships can cover a wide range of concepts and topics and some common concepts that can be covered under various types of internships:

- **Technical Skills**
  - Depending on the field, interns can develop technical skills such as programming languages, software tools, data analysis, design software, and more.
- **Soft Skills:**
  - Communication: Written and verbal communication skills, including effective email communication, presentations, and client interactions.
  - Teamwork: Collaborating with colleagues, working in cross-functional teams, and building effective relationships.
  - Time Management: Prioritizing tasks, managing deadlines, and staying organized.
  - Problem Solving: Analysing challenges, identifying solutions, and making informed decisions.
  - Adaptability: Handling changes, learning new processes, and adjusting to evolving situations.
- **Innovation and Entrepreneurship:**
  - Exploring innovative business ideas, product development, market research, and business model creation.

- **Data Analytics and Interpretation:**
- Learning how to work with data, perform analysis, and derive insights to inform decision-making.
- **Leadership and Management:**
- Developing leadership skills, understanding different management styles, and learning how to motivate teams.
- These are just a few examples of the many concepts that can be covered in internship programs. The specific concepts/coverage of the above will vary based on college infrastructure and faculty competence. It is important to tailor the internship experience to align with the interns' career goals and the industry needs.

Evaluation:

The report shall be prepared by the student under the guidance of the identified mentor in the college and submitted to the Head of the Department for evaluation. The report shall be evaluated by the two internal faculty members and submit the final sessional and summative marks to the university.

Program Name	**B.C.A**	Semester	**VI**
Course Title	**PROJECT WORK**		
Course Code:	**CACP352**	No. of Credits	**06**
Contact hours	**12 Hours per week**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**75**	Summative Assessment Marks	**75**

PROJECT GUIDELINES

Preamble: Project work has been made a part of BCA course to give students exposure to Software development exercises. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices. As such, during the development of the project students shall involve themselves in all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation with an overall emphasis on the development of reliable software systems. Since, the project work spans over the entire final semester, the students shall be advised to take up projects for solving problems of software industry or any research organization or the real life problems suggested by the faculty in- charge of BCA project work in the Institutions. Topic chosen of work must be nontrivial, analytical and application– oriented. It must involve substantial original work and/or development effort based on the theme. Solved, off-the-shelf and pirated work is not entertained .Any attempt of plagiarism or use of unfair means will result in rejection of the work. All activities of the Project Development must be time-bound and the equal participation of the team members expected throughout the Development process.

GENERAL GUIDELINES TO THE INSTITUTIONS

- Calendar of Project Work shall be announced before the commencement of the Sixth semester. Calendar should contain tentative schedules for the submission of Project Proposal, Project

Acceptance, Project Synopsis, Problem Analysis Document, System Design Document, Database Design , Detailed Design , Coding and Testing , Final Report, Internal Assessment exams (at least two), Viva/Voce etc.

- Students shall undertake projects with real life problems (that has direct relevance in day- to-day activities or to knowledge extension) either in their Colleges or in industry/research and development laboratories/software companies as recommended by the faculty in- charge of BCA project work in the Institutions. If a student intends to do industry project, the faculty in-charge shall ensure that the projects are genuine and original in nature.

- There shall be not more than three members in a Project team.
- At least two internal assessment exams shall be conducted to evaluate the progress made by the students at different stages of project work. Such exams may include written tests, document verification and presentations, work demonstration, group discussion, viva-voce etc. so as to objectively assess the understanding gained by the students in course of their project work.

PROJECT VALUATION

External and Internal Examiners together conduct project valuation objectively. To begin with, the finer details about various points contained in the scheme of valuation may be conclusively agreed upon through mutual consultation. During project evaluation, a student shall present his/her work through live demonstration of the software application developed as a part of project. However, if live demonstration is not possible due to the reason that some companies do not divulge source code on account of ownership rights or copyrights, students may be allowed to make PPT presentation of their authentic works. In such cases, candidates shall produce necessary declarations issued by the companies to this effect. However, students shall be enabled to present their work in entirety. The primary objective of project evaluation shall be to assess the extent of effort that was put in to meet the objectives of the project and also to gauge the understanding gained by the students in course of their project works. While evaluating Project Reports, examiners shall scrutinize whether Software Development Life Cycle (SDLC) principles have been consistently followed in the project work and

the same are documented well in the Reports. However, the relative and overall emphasis of these principles to a particular problem domain chosen may be taken into account so that project evalutions remain fair and objective.

SCHEME OF VALUATION AND MARKS DISTRIBUTION

	Particulars	Marks
Internal Assessment		
	Progress assessment for three Times @ 25 marks at each time	75
Project Report Valuation :50 marks		
1	Innovativeness and utility of the project for Industry/Academic or Society(Utility)	05
2	Related studies about the project (Adequacy)	05
3	Project plan & implementation-target achieved/output delivered(effectiveness)	
	3.1 Problem Analysis	05
	3.2 System Design	05
	3.3 Database Design	05
	3.4 Detailed Design	05
	3.5 Implementation	10
	3.6 Testing	05
4	Other mandatory documents & information (certificates, contents, tables, figures, bibliography etc.)	05
Viva-Voce : 25 marks		
1	Live Demonstration (Software execution) or Dry runs (Presentation of authentic screenshots or captured videos may be used to walk through complete scenarios)-consistency and completeness	15
2	Question and Answer (Oral only or Oral and written)	10
	Total Marks	150

FORMAT OF PROJECT SYNOPSIS

Synopsis is a brief outline or general view, as of a subject or written work; an abstract or a summary of the Project Work. It must be as brief (NOT MORE THAN 20 A4 sized paper pages) as is sufficient enough to explain the objective and implimentation of the project that the candidate is going to take up.

The write up must adhere to the guidelines and should include the following:

1. Title of the Project.
2. Introduction, objectives and scope of the Project.
3. Project category (Database/ Web Application/ Client-server/ Networking/ Multimedia/ Gaming/ Simulation etc).
4. Tools / Platform, Hardware and Software Requirement specifications.
5. Analysis (DFDs at least up to second level, ER Diagrams/ Class Diagrams, Database Design etc, as per the project requirements).
6. A complete structure which includes: Number of modules and their description to provide an estimation of the students effort on the project, Data Structures as per the project requirements for all the modules, Process logic of each module, testing process to be used, reports generation (Mention tentative content of report).
7. Whether Industry Defined/Client Defined/User Defined Project? Mention the type. Mention the name and Address of the Industry/Client.
8. Limitation of the project.
9. Future scope and further enhancement of the project.

GUIDELINES FOR PREPARATION OF DISSERTATION

1. ORGANISATION OF THE DISSERTATION

The dissertation shall be presented in a number of chapters; starting with Introduction and ending with Conclusion. Each of the chapters will have precise title reflecting the contents of the chapter. A chapter can be subdivided into sections, sub-sections and sub- sub-section so as to present the content discretely and with due emphasis.

Sequence of items in Dissertation Report

The following sequence may be followed in the preparation of the final dissertation report:

- Cover Page (On the hardbound cover)
- Title Page (Inner Cover Page)
- Certificate from the Institute
- Certificate from the Company
- Declaration
- Acknowledgement
- (Detailed) Table of Contents (with page numbers).
- List of Figures(with figure number, figure titles and page numbers)
- List of Tables with table number, table title and page number.
- Chapters

1. Introduction

a. Introduction of the System

i. Project Title

ii. Category

iii. Overview

b. Background
    i. Introduction of the Company
    ii. Brief note onn Existing System
c. Objectives of the System
d. Scope of the System
e. Structure of the System
f. System Architecture
g. End Users
h. Software/Hardware used for the development
i. Software/Hardware required for the implementation

2. SRS

a. Introduction (Brief write-up about SRS)
b. Overall Description
    i. Product perspective
    ii. Product Functions
    iii. User characteristics.
    iv. General constraints
    v. Assumptions
c. Special Requirements (Software / Hardware-if any)
d. Functional requirement.
    i. Module 1
    ii. Module 2
e. Design Constraints
f. System Attributes
g. Other Requirements (if any)

3. System Design (Functional Design)

a. Introduction (brief write-up about System Design)
b. Assumptions and Constraints
c. Functional decomposition
d. Description of Programs
    i. Context Flow Diagram (CFD)
    ii. Data Flow Diagrams (DFDs–Level 0, Level 1, Level 2)
e. Description of components
    i. Functional component 1
    ii. Functional component 2

4. Database Design (or Data structure)

a. Introduction (brief write-up about Database design)
b. Purpose and scope
c. Table Definition
d. ER diagram

5. Detailed Design (Logic design of modules)

a. Introduction (brief write-up about Database design)
b. Structure of the software package (structure chart)
c. Modular decomposition of the System
    i. Module1
        1. Inputs
        2. Procedural details
        3. File I/O interfaces
        4. Outputs
        5. Implementation aspects (if any)
    ii. Module 2 ……

6. Program code listing

a. Database connection
b. Authorization / Authentication
c. Data store / retrieval /update

d. Data validation
e. Search
f. Named procedures / functions
g. Interfacing with external devices (if any)
h. Passing of parameters
i. Backup/recovery
j. Internal documentation

7. **User Interface (Screens and Reports)**
   a. Login
   b. Main Screen / Home page
   c. Menu
   d. Data store / retrieval / update
   e. Validation
   f. View
   g. On screen reports
   h. Data Reports
   i. Alerts
   j. Error messages
8. **Testing**
   a. Introduction (brief write-up about Software Testing)
      i. Unit Testing
      ii. Integrate Testing
      iii. System Testing
   b. Test Reports

- Conclusion
- Limitations
- Scope for enhancement (future scope)
- Abbreviations and Acronyms (list)

- Bibliography / References (list in specified format)

Do not include any header or footer in any page of the report. Only page numbers should be mentioned at the bottom center of each page. 'n' copies of dissertation along with soft copy in CD should be prepared by the candidate.

2. DISSERTATION FORMAT

2.1 Paper

2.1.1 Quality

The dissertation shall be printed on white bond paper, whiteness 95% or above, weight 70 gram or more per square meter.

2.1.2 Size

The size of the paper shall be standard A4; height 297 mm, width 210 mm.

2.1.3 Type-Setting, Text Processing and Printing

The text shall be printed employing LaserJet or Inkjet printer, the text having been processed using a standard text processor. The standard font shall be Times New Roman of 12 pts with 1.5 line spacing.

2.1.4 Page Format

- The printed sheets shall have the following writing area and margins:
- Top margin .5"
- Bottom margin .5"
- Left margin 1"
- Right margin .75"

2.1.5 Pagination

Page numbering in the text of the dissertation shall be numerals starting from‘1’ at the center of the footer. The text of the written dissertation shall not beless than 60 pages excluding references, tables, questionnaires and other annexure.

Pagination for pages before the Introduction chapter shall be in lower case Roman numerals, e.g., ‘iv’.

2.1.6 Paragraph format

- Vertical space between paragraphs shall be about 2.5 line spacing.
- The first line of each paragraph should normally be indented by five characters or 12 mm. A candidate may, however, choose not to indent if (s) he has provided sufficient paragraph separation.
- A paragraph should normally comprise more than one line. A single line of a paragraph shall not be left at the top or bottom of a page (that is, no windows or orphans should be left). The word at the right end of the first line of a page or paragraph should, as far as possible, not be hyphenated.

2.2 Chapter and Section format

2.2.1 Chapter

Each chapter shall begin number (in Hindu on a fresh page with an additional top margin of about 75 mm. Chapter Arabic) and title shall be printed at the center of the line in 6 mm font size (18 pt) in bold face using both upper and lower case (all capitals or small capitals sha ll not be used). A vertical gap of about 25 mm shall be left between the chapter number and chapter title lines and between chapter title line and the first paragraph.

2.2.2 Sections and Sub sections

A chapter can be divided into Sections, Sub sections and Sub different concepts separately. Sections and sub-- sub sections so as to present sections can be numbered using decimal points, e.g., 2.2 for the second Section in Chapter 2 and 2.3.4 for the fourth Sub Sections and Sub-- section in third Section of Chapter 2. Chapters, Sections shall be included in the Contents with page numbers flushed to the right. Further subsections need not be numbered or included in the contents. The Sections and Sub sections titles along with their numbers in 5 and 4mm (16 and 14 pt) fonts, respectively, in bold face shall be flushed to the left (not centered) with 15 mm space above and below these lines. In further subdivisions character size of 3 and 3.5 with bold face, small caps, all caps and italics may be sued for the titles flushed left or centered. These shall not feature in the contents.

2.2.3 Table / Figure Format

As far as possible tables and figures should be presented in portrait style. Small size table and figures (less than half of writing area of a page) should be incorporated within

the text, while larger ones may be presented in separate pages. Table and figures shall be numbered chapter wise. For example, the fourth figure in Chapter 5 will bear the number Table Figure 5.4 or Fig.5.4

Table number and title will be placed above the table while the figure number and caption will be located below the figure. Reference for Table and Figures reproduced from elsewhere shall be cited in the last and separate line in the table and figure caption, e. g. (after McGregor [12]).

3. AUXILIARY FORMATS

a. Binding

The dissertation shall be hard cover bound in leather or rexin.

b. Front Covers

The front cover shall contain the following details:

- Full title of dissertation in 6 mm 22 point size font properly centered and positioned at the top.
- Full name of the candidate in 4.5 mm 15 point size font properly centered at the middle of the page.
- A 40 mm dia replica of the college emblem followed by the name of the Department and the year of submission, each in a separate line and properly centered and located at the bottom of the page.

i. Lettering

All lettering shall be embossed in gold.

ii. Bound back

The degree, the name of the candidate and the year of submission shall also be embossed on the bound (side) in gold.

c. Blank sheets

In addition to the white sheets (binding requirement) two white shall be put at the beginning and end of the dissertation.

d. Title sheet

This shall be the first printed page of the dissertation and shall contain the submission statement: the Dissertation submitted in partial fulfillment of the requirements of the BCA, the name and Roll No. Of the candidate, name (s) of the supervisor and co- supervisor (s) (if any), Department and year of submission.