RANI CHANNAMMA UNIVERSITY, BELAGAVI

PROGRAM /COURSE STRUCTURE AND SYLLABUS
as per the Choice Based Credit System (CBCS)
designed in accordance with
Learning Outcomes-Based Curriculum Framework (LOCF)
of National Education Policy (NEP) 2020
for
BACHELOR OF COMPUTER APPLICATIONS (BCA)

w.e.f.

Academic Year 2021-22 and onwards

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 specialisation in Computer Science were introduced to train manpower in this highly demanding area.

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

stage of the career. There are several employment opportunities and after successful completion of BCA, graduating students can fetch employment directly in companies as programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

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

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

PROGRAM OUTCOMES:

By the end of the program the following outcomes will be achieved by the students:

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 analyse 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 modelling, 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.

By the end of the program the students will be able to:

The Bachelor of Computer Application (BCA (Hons)) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation:

1. Apply standard Software Engineering practices and strategies in real -time software project development
2. Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics.
3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
4. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
5. The ability to work independently on a substantial software project and as an effective team member.

PROGRAM STRUCTURE

The following is the Program Structure for the BCA Program of Rani Channamma University:

Sem.	**Discipline Core (DSC) (Credits) (L+T+P)**	**Discipline Elective (DSE)/ Open Elective (OE) (Credits) (L+T+P)**	**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	**DSC-1:** Fundamentals of Computers **(5) (3+0+4)** **DSC-2:** Programming in **C (5) (3+0+4)** **DSC-3:** Mathematical Foundation/Accountancy **(3) (3+0+0)**	**OE-1**: C Programming Concepts / Accounting Package **(3) (3+0+0)**	**L1-1(3), L2-1(3)** (4 hrs. each)		**SEC-1:** (2) (1+0+2)	(1) (0+0+2)	(1) (0+0+2)	26
II	**DSC-4:** Data Structures Using C **(5) (3+0+4)** **DSC-5:** Object Oriented Concepts Using JAVA **(5) (3+0+4)** **DSC-6:** Discrete Mathematical Structures **(3) (3+0+0)**	**OE-2:** Office Automation / Computer Animation **(3) (3+0+0)**	**L1-2(3), L2-2(3)** (4 hrs. each)	Environmental Studies (2)		(1) (0+0+2)	(1) (0+0+2)	26
Exit option with Certificate in Computer Applications 52 credits)								
III	**DSC-7:** Data Base Management Systems **(5) (3+0+4)** **DSC-8:** C# and .NET Framework **(5) (3+0+4)** **DSC-9:** Computer Communication and Networks **(3) (3+0+0)**	**OE-3:** E-Commerce / E-Content Development **(3) (3+0+0)**	**L1-3(3), L2-3(3)** (4 hrs each)		SEC-2: (2) (1+0+2)	(1) (0+0+2)	(1) (0+0+2)	26
IV	**DSC-10**: Python Programming **(5) (3+0+4)** **DSC-11**: Computer Multimedia and Animation **(5) (3+0+4)**	OE-4: Web Designing / Multimedia Processing **(3) (3+0+0)**	**L1-4(3), L2-4(3)** (4 hrs each)	Constitution of India (2)		(1) (0+0+2)	(1) (0+0+2)	26

	DSC-12: Operating System Concepts (**3**) **(3+0+0)**							
Exit option with Diploma in Computer Applications 104 credits)								
V	**DSC-13**: Internet Technologies **(5)** **(3+0+4)** **DSC-14:** Statistical Computing and R Programming **(5)** **(3+0+4)** **DSC-15:** Software Engineering **(3) (3+0+0)**	**DSE-1:** Cyber law and Cyber Security OR Cloud Computing OR Business Intelligence **(3) (3+0+0)** VOC-1: DTP, Cad & Multimedia OR Hardware & Server Maintenance **(3) (3+0+0)**			**SEC-3**: SEC such as Cyber Security **(2) (1+0+2)**	(1) (0+0+2)	(1) (0+0+2)	23
VI	**DSC-16:** :PHP and MySQL **(5) (3+0+4)** **DSC-17:** Artificial Intelligence and Applications **(3)** **(3+0+0)** **PROJECT (5) (0+0+12)**	**DSE-2:** Fundamentals of Data Science OR Mobile Application Development OR Embedded Systems**(3)** **(3+0+0)** **VOC-2:** Web Content Management Systems OR Computer Networking **(3) (3+0+0)**			SEC-4: Professional Communication (2)	(1) (0+0+2)	(1) (0+0+2)	23
Exit Option with Bachelor of Computer Applications Degree 150 credits)								
VII	**DSC-18:** Analysis and Design of Algorithms **(5)** **(3+0+4)** **DSC-19:** Data Mining and Knowledge Management **(5)** **(3+0+4)** **CAI01:** Internship- **2**	**DSE-3**: Data Compression OR IoT OR Data Analytics **(3) (3+0+0)**						18(21)

		VOC-3: Healthcare Technologies OR Digital Marketing **(3) (3+0+0)**						
VIII	**DSC-20**: Automata Theory and Compiler Design **(5) (3+0+4)** **DSC-21:** Cryptography and Network Security **(3) (3+0+0)** **PROJECT (6) (0+0+12)**	DSE-4: Open Source Programming OR Storage Area Networks OR Pattern Recognition OR Machine Learning (3) (3+0+0) VOC-4: Office Automation (3) (3+0+0)						20
Award of Bachelor of Computer Applications (Honours) Degree 188 credits)								

COURSE STRUCTURE

SEMESTER – I

Sl. No.	Course Code	Course Type	Title of the Course/Paper	Instruction hrs / week (L+T+P)	Duration of Examination for Summative Assessment (in hrs.)	Marks			Credits
						Formative Assessment	Summative Assessment	Total	
1.	CAC01	DSC	Fundamentals of Computers	3-0-0	3	30	70	100	3
2.	CAC01P	DSC	Lab: Information Technology	0-0-4	3	10	40	50	2
3.	CAC02	DSC	Programming in C	3-0-0	3	30	70	100	3
4.	CAC02P	DSC	Lab: C Programming	0-0-4	3	10	40	50	2
5.	CAC03	DSC	(a) Mathematical Foundation OR (b) Accountancy	3-0-0	3	30	70	100	3
6.	CAE-1A	OE	(a) C Programming Concepts OR (b) Accounting Package	3-0-0	3	30	70	100	3
7.	BCAAE L1-1	L1-1	Kannada (Language 1)	-	-	-	-	-	3
8.	BCAAE L2-1	L2-1	MIL/MEL (Language 2)	-	-	-	-	-	3
9.	BCASEC01	SEC (Skill based)		-	-	-	-	-	2
10.	BCASEC02	SEC (Value based)		-	-	-	-	-	1
11.	BCASEC03	SEC (Value based		-	-	-	-	-	1
Total									**26**

SEMESTER – II

Sl. No.	Course Code	Course Type	Title of the Course/Paper	Instruction hrs /week (L+T+P)	Duration of Examination for Summative Assessment	Marks			Credits
						Formative Assessment	Summative Assessment	Total	
1.	CAC04	DSC	Data Structures using C	3-0-0	3	30	70	100	3
2.	CAC04P	DSC	Lab: Data Structures	0-0-4	3	10	40	50	2
3.	CAC05	DSC	Object Oriented Concepts using JAVA	3-0-0	3	30	70	100	3
4.	CAC05P	DSC	Lab: Java	0-0-4	3	10	40	50	2
5.	CAC06	DSC	Discrete Mathematical Structures	3-0-0	3	30	70	100	3
6.	CAE-2A	OE	(a) Office Automation OR (b) Computer Animation	3-0-0	3	30	70	100	3
7.	BCAAE03	AE L1	Kannada	-	-	-	-	-	3
8.	BCAAE04	AE L2	MIL/MEL	-	-	-	-	-	3
9.	SWAE04	AE	Environmental Studies	-	-	-	-	-	2
10.	SWAE05	SEC (Value based)	Physical Education Yoga	-	-	-	-	-	1
11.	SWSE06	SEC (Value based	NCC/NSS/R&R(S&G) / Cultural	-	-	-	-	-	1
Total								**-**	**26**

COURSE-WISE SYLLABUS

Semester I

Year	I	**Course Code:** CAC01	**Credits**	03
Sem.	I	**Course Title:** Fundamentals of Computers	**Hours**	42

Course Pre-requisites, if any:	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA: 03 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers 2. Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting 3. Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not-in 4. Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching 5. Web Programming basics, introduction of HTML and CSS programming 6. Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers. -

Unit No.	**Course Content**	**Hours**
Unit I	**Fundamentals of Computers:** Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples.	10
Unit II	**Introduction to computers:** Characteristics of computers, Classification of Digital Computer Systems: Microcomputers,	10

	Minicomputers, Mainframes, Super computers. Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory works.	
Unit III	**Operating System Fundamentals:** Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Booting.	10
Unit IV	**Introduction to Database Management Systems:** Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL	06
Unit V	**Internet Basics:** Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System. **Web Basics:** Introduction to web, web browsers, http/https, URL, HTML5, CSS	06
Recommended Learning Resources		
Print Resources	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,	
Digital Resources	1. J. Glenn Brook shear," Computer Science: An Overview", Addision-Wesley, Twelth Edition, 2. R.G. Dromey, "How to solve it by Computer", PHI,	

<table>
<tr><td>Year</td><td>I</td><td colspan="3">Course Code: CAC01P</td><td>Credits</td><td>02</td></tr>
<tr><td>Sem.</td><td>I</td><td colspan="3">Course Title: Lab: Information Technology</td><td>Hours</td><td>52</td></tr>
<tr><td colspan="3">Course Pre-requisites, if any:</td><td colspan="4">NA</td></tr>
<tr><td colspan="3">Formative Assessment Marks: 10</td><td colspan="2">Summative Assessment Marks: 40</td><td colspan="2">Duration of ESA: 04 hrs.</td></tr>
<tr><td></td><td colspan="6"><u>Part A:</u> Hardware

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. Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools); Application Software - Like Photo/Image Editors, Audio Recorders/Editors, Video Editors …); Freeware, Shareware, Payware and Trialware; Internet Browsers, Programming IDEs,

7. System Configuration – BIOS Settings, Registry Editor, MS Config, Task Manager, System Maintenance, Third-party System Maintenance Tools (Similar to CCleaner and Jv16 PowerTools …)</td></tr>
<tr><td></td><td colspan="6">Part B: Software

1. Activities using Word Processor Software

2. Activities using Spreadsheets Software

3. Activities using Presentation Software

4. Activities involving Multimedia Editing (Images, Video, Audio …)

5. Tasks involving Internet Browsing

6. Flow charts: Installation and using of flowgarithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of</td></tr>
</table>

	given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), arrays and recursion.

Reference:

1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K.A CRC press, 2014

2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer

Web References:

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

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Activity – 1 from Part A	Write up on the activity/ task	5
	Demonstration of the activity/ task	10
Activity-2 from Part B	Write up on the activity/ task	5
	Demonstration of the activity/ task	10
Viva Voice based on Lab Activities		05
Practical Records		05
Total		**40**

Year	I	**Course Code:** CAC02	**Credits**	03
Sem.	I	**Course Title:** Programming in C	**Hours**	42

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA: 03 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Confidently operate Desktop Computers to carry out computational tasks 2. Understand working of Hardware and Software and the importance of operating systems 3. Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts 4. Read, understand and trace the execution of programs written in C language 5. Write the C code for a given problem 6. Perform input and output operations using programs in C 7. Write programs that perform operations on arrays	
Unit No.	**Course Content**	**Hours**
Unit I	**Introduction to C Programming:** Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. **C Programming Basic Concepts:** C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants. **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.	10
Unit II	**C 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 Statements - Simple if, if_else, nested if_else, else_if ladder, Switch Case, goto, break & continue statements; Looping. Statements - Entry controlled and exit controlled statements, while, do-while, for loops, Nested loops.	12

Unit III	**Derived data types in C:** Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. **Strings:** Declaring & Initializing string variables; String handling functions - strlen, strcmp, strcpy and strcat; Character handling functions - toascii, toupper, tolower, isalpha, isnumeric etc.	08
Unit IV	**User Defined Functions:** Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type.	04
Unit V	**User defined data types:** Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.	08
Recommended Learning Resources		
Print Resources	1. C: The Complete Reference, By Herbert Schildt. 2. C Programming Language, By Brain W. Kernighan 3. Kernighan & Ritchie: The C Programming Language (PHI)	
Digital Resources	1. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB) 2. E. Balaguruswamy: Programming in ANSI C(TMH) 3. Kamthane: Programming with ANSI and TURBO C (Pearson Education) 4. V. Rajaraman: Programming in C (PHI –EEE) 5. S. Byron Gottfried: Programming with C(TMH) 6. Yashwant Kanitkar: Let us C 7. P.B. Kottur: Programming in C (Sapna Book House)	

Year	I	**Course Code:** CAC02P	**Credits**	02
Sem.	I	**Course Title:** Lab: C Programming	**Hours**	52

Course Pre-requisites, if any:	NA	
Formative Assessment Marks: 10	Summative Assessment Marks: 40	Duration of ESA: 04 hrs.

Part A:

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

Part B:

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

	8. Program to Reverse a String 9. Program to Swap Two Numbers 10. Program to demonstrate student structure to read & display records of n students. 11. Program to demonstrate the difference between structure & union.

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

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program – 1 from Part A	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	08
Program -2 from Part B	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	08
Viva Voice based on C Programming		05
Practical Records		05
Total		**40**

Year	I	**Course Code:** CAC03 (a)	**Credits**	03
Sem.	I	**Course Title:** Mathematical Foundation	**Hours**	42

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks:70	Duration of ESA: 03 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Study and solve problems related to connectives, predicates and quantifiers under different situations. 2. Develop basic knowledge of matrices and to solve equations using Cramer's rule. 3. Know the concept of Eigenvalues. 4. Todeveloptheknowledgeaboutderivativesandknowvariousapplicationsof differentiation. 5. Understand the basic concepts of Mathematical reasoning, set and functions	
Unit No.	**Course Content**	**Hours**
Unit I	**Basic concepts of set theory:** Mathematical logic introduction-statements Connectives-negation, conjunction, disjunction- statement formulas and truth tables- conditional and bi Conditional statements-tautology contradiction- equivalence of formulas-duality law-Predicates and Quantifiers, Arguments.	10
Unit II	**Operations on sets**: power set- Venn diagram Cartesian product-relations - functions- types of functions - composition of functions.	10
Unit III	**Matrix algebra:** Introduction-Types of matrices-matrix operations-transpose of a matrix -determinant of matrix - inverse of a matrix-Cramer's rule	10
Unit IV	**Matrix:** finding rank of a matrix - normal form-echelon form Cayley Hamilton theorem-Eigen values	06
Unit V	**Differential calculus:** Functions and limits - Simple Differentiation of Algebraic Functions – Evaluation of First and Second Order Derivatives – Maxima and Minima	06

Recommended Learning Resources	
Print Resources	1. P. R. Vittal-Business Mathematics and Statistics, Margham Publications, Chennai,
Digital Resources	1. B. S. Vatsa-Discrete Mathematics –New Age International Limited Publishers, New Delhi.

Year	I	**Course Code:** CAC03 (b)	**Credits**	03
Sem.	I	**Course Title:** Accountancy	**Hours**	42

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA: 03 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Study and understand Accounting, systems of Book, Branches of accounting advantage and limitations 2. Know the concept of accounting, financial accounting process and Journalization 3. Maintenance different account book and reconciliations 4. Preparations of different bills, and trial balance. 5. Understand the basic concepts of Mathematical reasoning, set and functions

Unit No.	**Course Content**	**Hours**
Unit I	**Introduction:** History and Development of Accounting, Meaning, Objectives and functions of Accounting, Book keeping V/s Accounting, Users of accounting data, systems of book keeping and accounting, branches of accounting, advantages and limitations of accounting	10
Unit II	**Accounting Concepts and Convention:** Meaning, need and classification, accounting standards meaning, need and classification of Indian accounting standards. Accounting principles V/s accounting standard Financial Accounting Process: Classification of accounting transactions and accounts, rules of debit and credit as per Double Entry System. Journalization and Ledger posting.	10
Unit III	**Preparation of Different Subsidiary Books:** Purchase Day book Sales Day Book, Purchase Returns Day Book, Sales Returns Day Book, Cash Book. Bank Reconciliation Statement: Meaning, Causes of Difference, Advantages, Preparation of Bank Reconciliation Statements.	10
Unit IV	**Account Procedure:** Honor of the Bill, Dishonor of the Dill, Endorsement, Discounting, Renewal, Bill for collection, Retirement of the Bill, Accommodation Bills, Bill Receivable Book and Payable Book. Preparation of Trial Balance: Rectification of errors and Journal Proper	06
Unit V	**Preparation of Final Accounts:** Meaning, need and classification, Preparation of Manufacturing, Trading, Profit and loss account and Balance – Sheet of sale- traders and partnership firms.	06

Recommended Learning Resources

Print Resources	1. S. Ramesh, B.S. Chandrashekar, A Text Book of Accountancy. 2. V.A. Patil and J.S. Korihalli, Book – keeping and accounting, (R. Chand and Co.Delhi). 3. R.S.Singhal, Principles of Accountancy,(Nageen Prakash pvt. Lit.Meerut). 4. M.B.Kadkol, Book–Keeping and Accountancy, (Renuka Prakashan, Hubil) 5. Vithal, Sharma: Accounting for Management, Macmillan Publishers, Mumbai.
Digital Resources	1. B B.S. Raman, Accountancy, (United Publishers, Mangalore). 2. Tulsian, Accounting and Financial Management – I:Financial Accounting – Person Education.

Open Electives in Computer Science:

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

Year	I	**Course Code:** CAE-1A (a)	**Credits**	3
Sem.		**Course Title: C programming Concepts**	**Hours**	3

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA:..3 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Read, understand and trace the execution of programs written in Clanguage 2. Write the C code for a givenproblem 3. Perform input and output operations using programs inC 4. Write programs that perform operations onarrays 5. Write user defined functions to perform a task

Unit No.	**Course Content**	**Hours**
Unit I	**Introduction to C Programming:** Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. **C Programming Basic Concepts:** C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants.	8
Unit II	**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 **C 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.	8
Unit III	**Control Structures:** Decision making Statements - S*imple if, if_else*, *nested if_else, else_if ladder, Switch Case*, *goto, break &continue* statements;	9

	Looping Statements - Entry controlled and exit controlled statements, *while, do-while, for* loops, Nested loops.	
Unit IV	**Derived data types in C:** Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. **Strings:** Declaring & Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric etc*	9
Unit V	**User Defined Functions:** Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type.	8
Recommended Leaning Resources		
Print Resources	Text Books: 1. C: The Complete Reference, By HerbertSchildt. 2. C Programming Language, By Brain W.Kernighan 3. Kernighan & Ritchie: The C Programming Language(PHI) Reference Books: 1. E. Balaguruswamy: Programming in ANSI C(TMH) 2. Kamthane: Programming with ANSI and TURBO C (PearsonEducation) 3. V. Rajaraman: Programming in C (PHI –EEE) 4. S. Byron Gottfried: Programming with C(TMH) 5. Yashwant Kanitkar: Let usC 6. P.B. Kottur: Programming in C (Sapna BookHouse)	

Year	I	**Course Code:** CAE-1A (b)	**Credits**	3
Sem.		**Course Title: Accounting Package**	**Hours**	42

Course Pre-requisites if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA:3 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. To train students in computerized accounting. 2. To make students well versed with tally package and generating reports.

Unit No.	**Course Content**	
Unit I	**Accounting Information System:** Basics of Accounting Practices and Preparation of Final Accounts, Introduction to Computerized Accounting. Information Systems. Difference between Manual and Computerized Accounting Information Systems, Accounts Receivable System	
Unit II	**Fundamentals of computerized Accounting:** Computerized accounting v/s manual accounting, architecture & customization of tally, features of tally 9.1 version, configuration of tally, tally screens and menus, creation of company, creation of group, Editing and deleting groups , creation of ledgers, Editing and deleting ledgers. Introduction to vouchers, voucher entry, payment voucher, receipt voucher, contra voucher, journal voucher, Editing and deleting vouchers.	
Unit III	**Introduction to Inventories:** Creation of stock categories, Creation of stock groups, Creation of stock items, configuration and features of stock items, Editing and deleting stocks, usage of stocks in voucher entry. Purchase order- stock vouchers, sales order.	
Unit IV	**Costing:** Introduction to cost, creation of cost category, creation of cost centers, Editing and deleting cost centers& categories, usage of cost category & cost, centers in voucher entry, budget & control, , Editing and deleting budgets, generating & printing reports in detail & condensed format.	
Unit V	**Generation of Reports:** Day books- Balance sheet, Trial balance, Profit & loss account, ratio analysis, cash flow statement, fund flow statement, cost center report, inventory report, bank reconciliation statement.	

Recommended Leaning Resources

Print Resources	Text Books/Websites 1. Computer Applictions in Business- Dr S.V Srinivasa- Sultan Chand publication 2. E-commerce: A managerial perspective: Michael change 3. www.amazon.com 4. Tally 9 by Dr. Namrata Agarwal 5. Tally 9 by Vishnupriya Singh

Semester II

Year	I	**Course Code:** CAC04	**Credits**	03
Sem.	II	**Course Title:** Data Structures using C	**Hours**	42

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA: 03 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used byalgorithms 2. Describe common applications for arrays, records, linked structures,stacks, queues, trees, and graphs 3. Write programs that use arrays, records, linked structures, stacks, queues, trees, andgraphs 4. Demonstrate different methods for traversingtrees 5. Compare alternative implementations of data structures with respect to performance 6. Describe the concept of recursion, give examples of itsuse 7. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

Unit No.	**Course Content**	**Hours**
Unit I	**Introduction to data structures:** Definition; Types of data structures - Primitive & Non-primitive, Linear and Non-linear; Operations on data structures. Dynamic memory allocation: Static & Dynamic memory allocation; Memory allocation and de-allocation functions - malloc, calloc, realloc and free.	08

	Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers;	
Unit II	Recursion: Definition; Types of recursions; Recursion Technique Examples - GCD, Binomial coefficient nCr, Towers of Hanoi; Comparison between iterative and recursive functions. Arrays as abstract data types, Representation of linear arrays in memory Traversing linear arrays; Inserting and deleting elements; Sorting – Selection sort, Bubble sort, Quick sort, Selection sort, Insertion sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching; Multidimensional arrays; Representation of multidimensional arrays; Sparse matrices.	10
Unit III	**Stacks:** Basic Concepts – Definition and Representation of stacks; Operations on stacks; Applications of stacks; Infix, postfix and prefix notations; Conversion from infix to postfix using stack; Evaluation of postfix expression using stack; Application of stack in function calls. **Queues:** Basic Concepts – Definition and Representation of queues; Types of queues - Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues;	08
Unit IV	**Linked list:** Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, Doubly liked list, Header liked list, Circular linked list; Representation of Linked list in Memory; Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion; Memory allocation; Garbage collection,	08
Unit V	**Trees:** Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth; **Binary tree:** Type of binary trees - strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; preorder, in order and post order traversal;	08
Recommended Learning Resources		
Print Resources	1. Ellis Horowitz and Sartaj Sahni: Fundamentals of Data Structures	

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

Year	I	**Course Code:** CAC04P	**Credits**	02
Sem.	II	**Course Title:** Lab: Data Structures	**Hours**	52

Course Pre-requisites, if any:	NA	
Formative Assessment Marks: 10	Summative Assessment Marks: 40	Duration of ESA: 04 hrs.

Part A:

1. Program to find GCD using recursive function
2. Program to display Pascal Triangle using binomial function
3. Program to generate n Fibonacci numbers using recursive function.
4. Program to implement Towers of Hanoi.
5. Program to implement dynamic array, find smallest and largest element of the array.
6. Program to create two files to store even and odd numbers.
7. Program to create a file to store student records.
8. Program to read the names of cities and arrange them alphabetically.
9. Program to sort the given list using selection sort technique.
10. Program to sort the given list using bubble sort technique.

Part B:

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

Note: Student has to execute a minimum of 08 programs in each part to complete the Lab course

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program – 1 from Part A	Flowchart/Algorithm	02
	Writing the Program	05

	Execution and Formatting	08
Program -2 from Part B	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	08
Viva Voice based on Data Structures		05
Practical Records		05
Total		**40**

Year	I	**Course Code:** CAC05	**Credits**	03
Sem.	II	**Course Title:** Object Oriented Programming with JAVA	**Hours**	42

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA: 03 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Understand the features of Java and the architecture of JVM 2. Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done 3. Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance 4. 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 5. Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

Unit No.	**Course Content**	**Hours**
Unit I	**Introduction to Java:** Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.	06
Unit II	**Objects and Classes:** Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.	06
Unit III	**Inheritance and Polymorphism:** Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	08
Unit IV	**Event and GUI programming:** Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.	10
Unit V	**I/O programming:** Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.	06

Unit VI	**Multithreading in java:** Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.	06
Recommended Learning Resources		
Print Resources	1. Programming with Java, By E Balagurusamy – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited. 2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, PrenticeHall 3. Object Oriented Programming with Java : Somashekara, M.T., Guru, D.S., Manjunatha,K.S	
Digital Resources	1. Java 2 - The Complete Reference – McGraw Hillpublication. 2. Java - The Complete Reference, 7th Edition, By Herbert Schildt– McGraw Hill publication.	

Year	I	**Course Code:** CAC05P		**Credits**	02
Sem.	II	**Course Title:** Lab: JAVA		**Hours**	52
Course Pre-requisites, if any:		NA			
Formative Assessment Marks: 10		Summative Assessment Marks: 40		Duration of ESA: 04 hrs.	
	Practice Labs 1. Program to print the following triangle of numbers 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5 2. Program to simple java application, to print the message, "Welcome to java" 3. Program to display the month of a year. Months of the year should be held in an array. 4. Program to find the area of rectangle. 5. program to demonstrate a division by zero exception 6. Program to create a user defined exception say Pay Out of Bounds.				
	Part A: Programming Lab – Java Fundamentals – OOPS in JAVA				

	1. Program to assign two integer values to X and Y. Using the 'if' statement the output of the program should display a message whether X is greater than Y. 2. Program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1) 3. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading. 4. Program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations. 5. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values. 6. Program a. To find the area and circumference of the circle by accepting the radius from the user. b. To accept a number and find whether the number is Prime or not 7. Program to create a student class with following attributes; Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details. 8. In a college first year class are having the following attributes Name of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class 9. Define a class called first year with above attributes and define a suitable constructor. Also write a method called best Student () which process a first-year object and return the student with the highest total mark. In the main method define a first-year object and find the best student of this class 10. Program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. ie, print them as per their seniority. 11. Create a package 'student. Fulltime. BCA 'in your current working directory a. Create a default class student in the above package with the following attributes: Name, age, sex. b. Have methods for storing as well as displaying
	PART B: Exception Handling & GUI Programming

	1. Program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values. 2. Program to handle Null Pointer Exception and use the "finally" method to display a message to the user. 3. Program which create and displays a message on the window 4. Program to draw several shapes in the created window 5. Program to create an applet and draw grid lines 6. Program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother also appear. 7. Create a frame which displays your personal details with respect to a button click 8. Create a simple applet which reveals the personal information of yours. 9. Program to move different shapes according to the arrow key pressed. 10. 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 11. Demonstrate the various mouse handling events using suitable example. 12. Program to create menu bar and pull-down menus.

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

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program – 1 from Part A	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	08
Program -2 from Part B	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	08
Viva Voice based on Java		05
Practical Records		05
Total		**40**

Evaluation Scheme for Internal Assessment

Theory

Assessment Criteria	**For 30 marks**
1st Internal Assessment Test for 40 marks2 hrs	12

2nd Internal Assessment Test for 40 marks 2 hrs	12
Attendance >75%	03
Assignment	03
Total	**30**

Assessment Criteria	**For 10 marks**
Internal Assessment Test for 40 marks 2 hrs	05
Attendance >75%	03
Assignment	03
Total	**10**

Practical

Assessment Criteria	**For 10 marks**
Internal Assessment Test for 40 marks 2 hrs	05
Attendance >75%	03
Journal (Practical Record)	03
Total	**10**

Year	I	**Course Code:** CAC06	**Credits**	04
Sem.	II	**Course Title:** Discrete Mathematical Structures	**Hours**	42

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 30	Summative Assessment Marks: 70	Duration of ESA: 03 hrs.

Course Outcomes	At the end of the course the student should be able to: 1. To understand the basic concepts of Mathematical reasoning, set and functions. 2. To understand various counting techniques and principle of inclusion and exclusions. 3. Understand the concepts of various types of relations, partial ordering and 4. Equivalence relations. 5. Apply the concepts of generating functions to solve the recurrence relations. 6. Familiarize the fundamental concepts of graph theory and shortest path algorithm

Unit No.	**Course Content**	**Hours**
Unit I	**The Foundations:** Logic and proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy. **Basic Structures:** Sets, Functions, Sequences, Sums, and Matrices: Sets, set operations, Functions, Sequences and Summations, matrices.	12
Unit II	**Counting:** Basics of counting, Pigeonhole principle, Permutation and combination, Binomial Coefficient and Combination, Generating Permutation and Combination. **Advanced Counting Techniques:** Applications of Recurrence Relations, Solving Linear Recurrence, Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion-exclusion.	10
Unit III	**Induction and Recursion:** Mathematical Induction, Strong Induction and Well- Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Corrections. **Relation:** Properties of relation, Composition of relation, Closer operation on relation, Equivalence relation and partition. Operation on relation, Representing relation.	12
Unit IV	**Graphs**: Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring..	08

Recommended Learning Resources	
Print Resources	1. Discrete Mathematics and Its Applications, Kenneth H. Rosen: Seventh Edition, 2012.
Digital Resources	1. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross, 2003. 2. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI1986. 3. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5Edition. 4. Discrete Mathematical Structures, Trembley and Manobar.

Year	I	**Course Code:** CAE-2A (a)	**Credits**	3
Sem.	**I**	**Course Title:** Office Automation	**Hours**	**42**

Course Pre-requisites, if any	NA	
Formative Assessment Marks:	Summative Assessment Marks:	Duration of ESA:.. hrs.

Course Outcomes	At the end of the course the student should be able to: 1. To create awareness of computers and its classification. 2. To gain understanding of Operating systems and its functions. 3. To develop and understanding of the various functions in Word processor and Presentation software. 4. To solve problems using spreadsheets.

Unit No.	**Course Content**	**Hours**
Unit I	**Basics of Computers:** Introduction to Computer: Definition - History & Generation of Computer (From First to 5th) - Applications of Computer – Advantages of Computer – Terms related to Computer - Characteristics of Computer: Speed, Storage, Versatility and Diligence – Hardware & Software. Block Diagram and Working Principle of Computer - Types of Computer: On the Basis of Size - Main frame, Mini Computer, Super Computer, Work station, Micro Computer, Desktop Computer, Laptop Computer, Memory: Units, Representation, Types - Primary memory: RAM, ROM, PROM, EPROM, EEPROM, DDR Secondary memory: Hard disk, CD, DVD, Blue ray Disc, Pen Drive Magnetic tape & Zip disk. CPU: Components of CPU - Mother board, Hard disk, RAM, ROM, Processor, SMPS & Connecting wire - Graphics Card, Sound Card, Network Card – Modem; Input, Output devices: Keyboard, Mouse, Scanner, Digital Camera, Joystick, Pen drive, Monitor, Printer, Plotter – Connecting port– Serial, parallel–port, USB port	10
Unit II	**Operating System**	8

	Definition of Operating System - Functions of OS, Windows Desktop - GUI: Definition, Standards, Cursors/Pointers, Icons, GUI Menus, Desktop icons and their functions: My computer, My documents, Network neighborhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar – Dialog Boxes: List Box, Spin Control Box, Slide, Drop-down list, Radio button, Check box, Text box, Task Bar - System Tray - Quick launch tool bar - Start button – Parts of Windows -Title bar-Menu bar - Scroll bar- Status bar, Maximize, Minimize, close and Resize & Moving a Window – Windows - Start Menu –Help Menu- Preview Menu; Logoff & Shutdown–Keyboard Accelerators: Key board short keys or hotkeys – Working with Notepad & Word-pad: Opening & Saving files, Formatting, Printing, Inserting objects, Finding & replacing text, Creating & Editing Images with Microsoft paint, using the Calculator.	
Unit III	**Working with Documents** Introduction to MS Office/Open Office: Working with Documents -Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Using Tool bars, Ruler, Formatting Documents - Setting Font styles, Font selection- style, size, colour etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering. Setting Page style - Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer – Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula, Drawing - Inserting ClipArts, Pictures/Files etc., Tools – Word Completion, Spell Checks, Mail merge, Templates.	8
Unit IV	**Working with Spread Sheets** Introduction to MS Excel/ Open Office – Calc: Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, Saving files, setting Margins, Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells. Entering & Deleting Data- Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Manual breaks, Setting Formula - finding total in a column or row,	8

	Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae. Formatting Spreadsheets: Labeling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/ Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc, Borders & Shading – Shortcut keys. Working with sheets – Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts - Drawing. Printing. Using Tools – Error checking, Spell Checks, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.	
Unit V	**Presentation** Introduction to MS Power Point / Open Office-Impress: Introduction to presentation – Opening new presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts. Creating a presentation - Setting Presentation style, Adding text to the Presentation. Formatting a Presentation - Adding style, Colour, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Drawing Pictures using Draw. Adding Effects to the Presentation- Setting Animation & transition effect. Printing Handouts, Generating Standalone Presentation viewer.	8
Recommended Leaning Resources		
Print Resources	1 Fundamentals of computers - V.Rajaraman - Prentice- Hall of india. 2 Computer Fundamentals - P. K. Sinha Publisher: BPB Publications. 3 Microsoft Office 2007 Bible - John Walkenbach,Herb Tyson,Faithe Wempen, cary. Prague, Michael R.groh, Peter G.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd. 4 A Conceptual Guide to OpenOffice.org 3 - R. Gabriel Gurley- CreateSpace Independent Publishing Platform, 2008	
Digital Resources	1 https://wiki.openoffice.org/wiki/Documentation.	

Year	I	**Course Code:** CAE-2A (b)	**Credits**	04
Sem.	I	**Course Title:** Computer Animation	**Hours**	42

Course Pre-requisites, if any	Creative ability, Software skills.	
Formative Assessment Marks:	Summative Assessment Marks:	Duration of ESA: hrs.

Course Outcomes	At the end of the course the student should be able to: 1. To develop improved their animation skill. 2. To provide improved their software knowledge. 3. To develop editing skills of learners. 4. To create animation projects and implementing them.

Unit No.	**Course Content**	**Hours**
Unit I	Introduction to Animation: Animation Definition, Science behind Animation, 12 basic principles of animation. Types of animations: Traditional, 2D animation, 3D animation. History of Animation: Conventional methods of animation.	4
Unit II	Animation Production Pipeline: terms used in animation, Introduction to story board. Tools required for animation: Light board, Pin bar, Digital tools (software).	4
Unit III	Overview of Flash: Flash interface, stage setting, Frame rate, layers, timeline, properties, flash tools.	4
Unit IV	Drawing in Flash: Drawing Modes, Drawing Techniques, Text and Colors. Symbols: Graphic Symbol, Button Symbol, Movie clip symbol.	15
Unit V	Animation: Frame and Key frame, Motion guide, key frame animation, masking. Tweens: Motion tween, classic tween, shape tween.	15

Recommended Leaning Resources

Print Resources	1 The Complete Animation course by Chris Patmore, By – Barons Educational Series (New York). 2 Anatomy of the Artist – Thompson & Thompson. 3 Flash CS4 Professional Bible Published by Wiley Publishing (Robert R & Snow D.).