BAGALKOT UNIVERSITY

Mudhol Road, Jamkhandi-587301 Dist: Bagalkot

PROGRAM /COURSE STRUCTURE AND SYLLABUS
FOR
BACHELOR OF COMPUTER APPLICATIONS

as per the Choice Based Credit System (CBCS) designed in accordance with
Learning Outcomes-Based Curriculum Framework (LOCF)

For
Bachelor of Science
(BCA)
(General Degree)
I and II Semester

w.e.f.

Academic Year 2024-25

Preamble for UG Syllabus of Bagalkot University

Bagalkot University Jamkhandi has been established by the Government of Karnataka and has started functioning from the academic year 2023-24. All the degree colleges other than engineering and medical colleges in the district of Bagalkote, are affiliated to this university as per the Karnataka State Universities Act 2000, as modified by the 26th Act of 2022. The students taking admission to any of the colleges in the district of Bagalkote, from the academic year 2023-24 will be students of Bagalkot University. The Government of Karnataka has instructed all the Universities to revise the under graduate syllabus as per the Government order no. ED 166 UNE 2023 Bengaluru Dated 08-05-2024 from the academic year 2024-25.

Hence the Bagalkot University has revised the syllabus as suggested by its Board of Studies and approved by Academic Council and Syndicate. The subject code format for all the subjects of the new syllabus is also revised.

The subject code format is described in the following.

Subject Code Format

1	2	3	4	5	6	7	8	9	10
VER	DEGREE	SEM	DISCIPLINE			SUB. TYPE	SL. NO. FOR SUB. TYPE		TH/LAB/F
2	A	1	C	H	E	M	0	1	T
2	B	1	P	O	L	M	0	1	T

[1]The Version information gives the version of the syllabus. It can take values 1,2..9,a,b,…

[2]The UG degree codes to be provided as / The code applicable to all degrees

Sl. No	Degree Code		Degree
1	B.Sc.	A	Bachelor of Science
2	B.A	B	Bachelor of Arts
3	B.Com.	C	Bachelor of Commerce
4	BBA	D	Bachelor of Business Administration
5	BCA	E	Bachelor of Computer Applications
6	BSW	F	Bachelor of Social Work
7.	-----------	S	Applicable to all degrees

[3]The Semester Information is provided as

Sl. No	Semester
1	1
2	2
3	3
….	

[4-6]The Discipline Information to be provided as

Sl No	Degree	Discipline Code
1	B.Com.	XXX
2	BCA	XXX
3	BBA	XXX
4	BSW	XXX
5	B.A	'HIS', POL','GEO','KAN', 'HIN' etc. The detailed list is to be provided
6	B.Sc.	'PHY','CHE', 'BOT','ELE' etc. The detailed List is to be Provided

[7] The Subject Type to be provided as

Sl. No.	TYPE	Description
1	Major	M
2	Language	L
3	Constitutional Moral Values	C
4.	Elective	E
5.	Skill / Practical based learning	S
6.	Mini Project	P
7.	Internship	I
8.	Case study/ Survey using principles of Research methodology	R

[8-9] The Running Serial Number is to be provided for a particular Subject type 01 to 99

[10] This character specifies the category of the subject namely, T=Theory, L-Practical, P-Project Work, F-Field work, Viva-V, I-Internship, Dissertation-D

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 HE Is introduced programmes of computer application. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavor 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, B.Sc and M.Sc programmes with specialization in Computer Science were introduced to train manpower in this highly demanding area.

BCA 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 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 programminglanguages 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 analyze 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 uses of tware tools to solve real world problems and evaluate

PROGRAMOUTCOMES:

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

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 an analyze problems related to computer science and exhibiting around 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 minimumknowledge on statistics and optimization problems. Establishing excellent skillsin 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 applications of 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 integrity 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) 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 anddata 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

Curricular and Credits Structure under Choice Based Credit System [CBCS] for the Three Years Computer Application (BCA) under graduate Programme with effect from 2024-25

SEMESTER-1											
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/week**			**Credit**	**Duration Of exams (Hrs)**	**Teaching Department**
			IA	**SEE**	**Total**	**L**	**T**	**P**			
L-1	-----------	Language 1	20	80	100	3	0	0	3	3	------------
L-2	-----------	Language 2	20	80	100	3	0	0	3	3	------------
Major	2E1XXXM01T	Programming in C	20	80	100	4	0	0	4	3	Computer Science
	2E1XXXM01L	C Programming Lab	10	40	50	0	0	4	2	3	Computer Science
Major	2E1XXXM02T	Fundamentals of Computers	20	80	100	4	0	0	4	3	Computer Science
	2E1XXXM02L	Information Technology Lab	10	40	50	0	0	4	2	3	Computer Science
Major	2E1XXXM03T	Mathematical Foundation*	20	80	100	4	0	0	4	3	Mathematics
	2E1XXXM04T	Accountancy*									Commerce
COM1	2S1XXXC01T	Constitutional Values	10	40	50	2	0	0	2	2	Constitutional Values: • Political Science
	2S1XXXC02T	Environmental Studies									Environmental Studies: • Chemistry/Geology/ Geography/ Botany
Total Marks					**650**	**Semester Credits**			**24**		

SEMESTER-2										
Category	Coursecode	Title of the Paper	Marks			Teaching hours/ week			Credit	Duration of exams (Hrs)	Teaching Department
			IA	SEE	Total		T	P			
L-3	-------	Language 3	20	80	100	3	0	0	3	3	------------
L-4	-------	Language 4	20	80	100	3	0	0	3	3	------------
Major	2E2XXXM05T	Data Structures using C	20	80	100	3	0	0	4	3	Computer Science
	2E2XXXM03L	Data Structures Lab	10	40	50	3	0	4	2	3	Computer Science
Major	2E2XXXM06T	Object Oriented Concepts using Java	20	80	100	3	0	0	4	3	Computer Science
	2E2XXXM04L	JAVA Lab	10	40	50	3	0	4	2	3	Computer Science
Major	2E2XXXM07T	Discrete Mathematics	20	80	100	3	0	0	4	3	Computer Science/ Mathematics
COM2	2S1XXXC01T	Constitutional Values	10	40	50	2	0	0	2	2	Constitutional Values: • Political Science
	2S1XXXC02T	EnvironmentalStudies									Environmental Studies: • Chemistry/Geology/ Geography/ Botany
Total Marks					650	Semester Credits			24		

Concept Note, Abbreviation Explanation and Coding:

Concept Note:

1. CBCS is a mode of learning in higher education which facilitates a student to have some freedom in selecting his/her ownchoices, across various disciplines for completing a UG/PG program.
2. A credit is a unit of study of a fixed duration. For the purpose of computation of workload as per UGC norms the following ismechanism be adopted in the university: One credit (01) =One Theory Lecture (L) period of one(1) hour. One credit (01)=One Tutorial (T) period of one(1) hour.One credit (01)=One practical(P)period of two(2)hours.

3. Internship is a designated activity that carries some credits involving more than 25 days of working in an organization (either in same organization or outside) under the guidance of an identified mentor. Internship shall be an integral part of the curriculum.

Abbreviation Explanations:

1. M : Major Subject

2. L1: Language One

3. L=Lecture; T=Tutorial ;P=Practical.

Year	I	Course Code: 2E1XXXM01T	Credits	04

Sem.	I	**Course Title:** Programming in C		Hours	52
Course Pre-requisites: Nil		NA			
Formative Assessment Marks: 20		Summative Assessment Marks:80		Duration of ESA: 03 hrs.	
Course Out comes		At the end of the course the student should be able to: 1. Read, understand and trace the execution of programs written in C language 2. Apply programming control structures for a given problem to create C code 3. Understand derived data types and develop C code using arrays/strings 4. Understand user defined functions and data types to develop C code			
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.		13	
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; Typeconversion. **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.		13	

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-to ascii, to upper, to lower, is alpha, is numeric etc. **User Defined Functions:** Need for user defined functions; Format of 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.	1 3
Unit-IV	**Pointers:** Understanding pointers-Declaring and initializing pointers, accessing address and value of variables using pointers; Chain of Pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and Disadvantages of using pointers. **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.	1 3

Recommended Learning 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)
4. P.K.Sinha & Priti Sinha: Computer Fundamentals(BPB)
5. E.Balaguruswamy: Programming in ANSI C(TMH)
6. Kamthane: Programming with ANSI and TURBOC(Pearson Education)
7. V.Rajaraman:Programming in C(PHI–EEE)
8. S.ByronGottfried:Programming with C(TMH)
9. Yashwant Kanitkar:LetusC
10. P.B.Kottur:Programming in C(SapnaBookHouse)

Year	I	**Course Code:** 2E1XXXM01L	**Credits**	02
Sem.	I	**Course Title:** C Programming Lab	**Hours**	50

Course Pre-requisites		NA	
Formative Assessment Marks: 10		Summative Assessment Marks:40	Duration of ESA: 03 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 generate the factorial of a given number
5. Program to generate n Fibonacci sequence
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 switch Case statement)
9. Program to find the roots of quadratic equation(Demonstration of else-if ladder)
10. Program to read marks scored by number of students and find the average of marks
11. Program to remove Duplicate Element in a single dimensional Array

Part-B:

1. Program to Swap Two Numbers
2. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters
3. Program to Reverse a string without using built in function
4. Program to find the length of a string without using built in function
5. Program to demonstrate string functions.
6. Program to read, display and to find the trace of a square matrix
7. Program to perform addition and subtraction ofMatrices.
8. Program to check a number for prime by defining isprime() function.
9. Write C Program to implement arrays with pointers.
10. Implement C Programs to perform arithmetic operations using Pointer.
11. Program to demonstrate student structure to read & display records of n students.
12. Program to demonstrate the difference between structure & union.

Year	**Course Code:** 2E1XXXM02T		**Credits**	04
Sem.	**Course Title:** Fundamentals of Computers		**Hours**	52

Course Prerequisites	NA	
Formative Assessment Marks:20	Summative Assessment Marks: 80	Duration Of ESA: 03hrs.
Course Outcomes	At the end of the course the student should be able to: 1. Create an awareness of computers its classification and anatomy 2. Understand Number systems, Computer Languages and the steps for problem solving 3. Understand the fundamentals of operating terms and basic commands 4. Understand basic concepts of DBMS and Internet	

Unit No.	Course Content	Hours
Unit-I	**Fundamentals of Computers:** Introduction to Computers -Computer Definition, Characteristics of Computers, Evolution and Generations of Computers, BasicOrganization of a Digital Computer; Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory works. Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Supercomputers	13
Unit-II	**Number Systems** – different types, conversion from one number system to another; Computer Codes–BCD, Gray Code, ASCII; Boolean Algebra– Boolean Operators with Truth Tables; **Computer Languages** –Machine Level, Assembly Level & High Level Languages, Translator Programs–Assembler, Interpreter and Compiler; Planning a Computer Program– Algorithm and Flow chart with Examples.	13

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 Commands(cal ,date, bc, echo, who, ls, pwd, cd, mkdir, rmdir),Commands to work with file(cat, cp,rm,mv,file,wc,head,tail)	13
Unit-IV	**Introduction to Database Management Systems:** Database, DBMS, Why Database - File system vs DBMS, Database applications, Database users, Introduction to SQL, Classification of SQL-DDL,DML,DCL. **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.	13

Recommended Learning Resources

1. Fundamentals of Computers : Dr Dayanand G Savakar, Mr. Dharmaraj Kumbar and Mr Praveen Jigajinni.
2. Pradeep K.Sinha and Priti Sinha:Computer Fundamentals (Sixth Edition),BPB Publication
3. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,
4. J.Glenn Brookshear, "Computer Science: An Overview", Addision-Wesley, Twelth Edition,
5. R.G.Dromey,"Howto solve it by Computer",PHI,

Year	I	**Course Code:** 2E1XXXM02L	**Credits**	02
Sem.	I	**Course Title:** Information Technology Lab	**Hours**	50
Course Pre-requisites		NA		
Formative Assessment Marks:10		Summative Assessment Marks:40	Duration of ESA: 03hrs.	

Part-A: 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 Troubleshooting.
4. LAN and Wi-Fi 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/ImageEditors, Audio Recorders/Editors, Video Editors); Freeware, Shareware, Pay ware and Trial ware; Internet Browsers, Programming IDEs,
7. System Configuration – BIOS Settings, Registry Editor, MSConfig, Task Manager, System Maintenance, Third-party System Maintenance Tools (Similar to C-Cleaner and Jv16 Power Tools)

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 logarithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes(Square, Rectangle, Circle and Triangle),arrays andrecursion.

Note: Use any Open sources of software To execute the Above assignments.

Reference:

1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K. ACRC press,2014
2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer
Web References:
http://www.flowgorithm.org/documentation/

Year	I	**Course Code:** 2E1XXXM03T	**Credits**	04
Year	I	**Course Title:** Mathematical Foundation*	**Hours**	52
Course Pre-requisites		NA		
Formative Assessment Marks: 20	Summative AssessmentMarks:80		Duration of ESA: 03hrs.	
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 sequences and series 4. To develop the knowledge about derivatives and various applications of differentiation. 5. Understand the basic concepts of Mathematical reasoning, set and functions			

Unit No.	Course Content	Hours
Unit-I	**Mathematical logic:** Mathematical logic introduction statements Connectives-negation, Conjunction, disjunction statement formulas and truth tables-conditional and bi Conditional statements-tautology contradiction-equivalence of formulas-duality law-Predicates and Quantifiers, Arguments.	13
Unit-II	**Basic concepts of set theory: Operations on sets**: power set- Venn diagram Cartesian product-relations - functions- types of functions-composition of functions.	13
Unit-III	**Matrix algebra:** Introduction- Types of matrices-matrix operations-transpose of a matrix-determinant of matrix-inverse of a matrix-Cramers rule. Cayley Hamilton theorem-Eigen values	13
Unit-IV	**Sequences and Series:** Introduction, Sequences, series, arithmetic progression, geometric progression, relationship between A.M and G. M, sum to n terms of special series.	13
Recommended Learning Resources		
1. P.R.Vittal-Business Mathematics and Statistics, Margham Publications,Chennai 2. B.S.Vatsa- Discrete Mathematics–New Age International Limited Publishers,NewDelhi		

Year	I	**Course Code:** 2E1XXXM04T	**Credits**	04
Sem.	I	**Course Title:** Accountancy	**Hours**	52

Course Pre-requisites	NA		
Formative Assessment Marks:20	Summative Assessment Marks:80		Duration of ESA: 03hrs.
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.		

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, advantage and limitations of accounting	13
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.	13
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.	13

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. **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.	13

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Recommended Learning Resources

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Reference Books:

1. S. Ramesh, B.S. Chandrashekar, A Text book of Accountancy.
2. V.A.Patiland J.S.Korlahalli, Book–keeping and accounting,(R.Chandand 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.
6. BB.S.Raman, Accountancy,(United Publishers,Mangalore).
7. Tulsian, Accounting and Financial Management– I:Financial Accounting– Person Education

Year	I	**Course Code:** 2E2XXXM05T	**Credits**	04
Sem.	II	**Course Title:** Data Structures using C	**Hours**	52

Course Prerequisites, if Any	Knowledge of Programming

Formative Assessment Marks:20	Summative Assessment Marks:80	Duration Of ESA: 03hrs.

Course Outcomes	At the end of the course the student should be able to: 1. Understand the classification of data structures and dynamic memory allocation. 2. Understand the difference between iteration and recursion and apply recursive definition for problem solving. 3. Understand and evaluate the applications of stacks and queues. 4. Understand and evaluate the applications of linked lists and tree.

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–allocationfunctions- malloc, calloc, realloc and free. **Recursion:** Definition; Types of recursions; Recursion Technique Examples - GCD, Binomial coefficient nCr, Towers of Hanoi; Comparison between iterative and recursive functions.	13
Unit II	**Sorting and Searching:**Arrays as abstract data types, Representation of linear arrays in memory, Traversing line arrays; Inserting and deleting elements;Sorting – Selection sort, Bubble sort, Quick sort, Merge sort, Insertion sort; Searching-Sequential Search, Binary search; Iterative And Recursive searching	13

Unit III	**Stacks:** Basic Concepts–Definition and Representation of stacks; Operations on stacks – Push, Pop; 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 andRepresentation of queues; Types of queues,-Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues;	13
Unit IV	**Linked list:** Basic Concepts–Definition andRepresentation of linked list, Types of linked lists – Singly linked list, Doubly linked list, Circular linked list Doubly Circular Linked list; Representation of Linked list in Memory; Operations on Singly linked lists– Traversing, Searching, Insertion, Deletion; **Trees:** Definition; Tree terminologies– node, root node, parent node, ancestors of anode, siblings, terminal &non- terminal nodes, degree of anode, level, edge, path, depth; **Binary tree:** Type of binary trees-strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; preorder, inorder and postorder traversal.	13
Recommended Learning Resources	

1. Ellis Horowitz   and   Sartaj Sahni: Fundamentals   of Data Structures
2. Tanenbaum: Data structures using C(Pearson Education)
3. Kamathane: Introduction   to   Data   structures(Pearson Education)
4. Y.Kanitkar: Data Structures Using C(BPB)
5. Kottur: Data Structure Using C
6. Padma Reddy :Data Structure Using C

Year	I	**Course Code:** 2E2XXXM03L **Course Title:** Data Structures Lab	**Credits**	02
Sem.	II		**Hours**	50

Course Pre-requisites	Knowledge of Programming		
Formative Assessment Marks:10	Summative Assessment Marks:40		Duration of ESA:03hrs.

	Part A: 1. Program to find GCD using recursive function 2. Program to generate binomial coefficient using recursive function. 3. Program to generate n Fibonacci numbers using recursive functions. 4. Program to implement Towers of Hanoi using recursion. 5. Program to implement dynamic array, find smallest and largest element of the array. 6. Program to read the names of cities and arrange them alphabetically. 7. Program to sort the given list using selection sort technique. 8. Program to sort the given list using bubble sort technique. 9. Program to sort the given list using insertion sort technique.
	Part B: 1. Program to sort the given list using quick sort technique. 2. Program to sort the given list using merge sort technique. 3. Program to search an element using linear search technique. 4. Program to search an element using binary search technique. 5. Program to implement Stack. 6. Program to convert an infix expression to postfix. 7. Program to implement simple queue. 8. Program to implement linear linked list. 9. Program to display in-order traversal of a binary tree.

Year	I	**Course Code** 2E2XXXM06T		**Credits**	04
Sem.	II	**Course Title:** Object Oriented Concepts using JAVA		**Hours**	52
Course Pre-requisites, if any		Knowledge of Programming			
Formative Assessment Marks:20		Summative Assessment Marks:80		Duration of ESA: 03hrs.	
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 concept 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 Exception handling mechanism compared to other Programming Languages 5. Write, compile, execute Java program that include GUIs and eventdriven programming and also programs based on files.			
Unit No.		**Course Content**		**Hours**	
Unit I		**Introduction to Java :** OOPs concepts, Basics of Java programming, Data types, Variables, Operators, Control structures including selection ,Looping, Arrays in java. **Objects and Classes** **:**Basics of objects and classes in java, Methods and objects, Instance of operator, Visibility modifiers, Method Overloading, Constructors, Static Members		13	
Unit II		**Inheritance and Polymorphism :** Inheritance in java, Super and subclass, Types of inheritance, Overriding, Polymorphism, Dynamic binding, Abstract class, Interface in java, Packages in java-defining and importing user defined packages.		13	
Unit III		**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 Swing components like Buttons, Check Boxes , Radio Buttons, Labels, Text Fields,		13	

	Text Areas, Combo Boxes, Lists, Windows, Menus.	
Unit IV	**Multithreading in java :** Thread life cycle and methods, Runnable interface, Thread priorities, Exception handling mechanism with try catch-finally. **I/O programming:** Java Input Output: JavaIO package, File, Byte/ Character Stream, File reader/writer.	13

Recommended Learning Resources

Reference Books:

1. Java, By E Balagurusamy– A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
2. Core Java Volume I–Fundamentals, By Cay S. Horstmann, Prentice Hall
3. Object Oriented Programming with Java : Somashekara,M.T., Guru,D.S., Manjunatha,K.S
4. Java2-The Complete Reference–McGraw Hill publication.
5. Java-The Complete Reference,7thEdition, By Herbert Schildt–McGraw Hill publication.

Year	I	**Course Code:** 2E2XXXM04L **Course Title:** JAVA Lab		**Credits**	02
Sem.	II			**Hours**	50
Course Pre-requisites		Knowledge of Programming			
Formative Assessment Marks:10		Summative Assessment Marks:40		Duration of ESA: 03hrs.	

Part A:

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 find the area and circumference of the circle by accepting the radius from the user.

4. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function over loading.

5. 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. M ulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.

6. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occurring the object"s member variable values.

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 passing 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. Write a program to demonstrate multiple inheritance and use of Implementing Interfaces

9. Illustrate creation of thread by

   a) Extending Thread class.

	b)Implementing Runnable Interfaces
	10. Create a package "BCA" in your current working directory. a. Create a class student in the above package with the following attributes: Name, age, gender. Include appropriate constructor and a method for displaying the details. b. Import above package and access the member variables and function contained in a package.
	PART B: Exception Handling & GUI Programming 1. Program to catch Negative Array Size Exception. This exception is caused when the array size is initialized to negative values. 2. Program to demonstrate exception handling with try, catch and finally. 3. Program which creates and displays a message on the window 4. Program to draw several shapes in the created window 5. Program to create 4×4 grid and fills it in with 15 buttons, each Labeled with its index. 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 button similar details of mother also appear. 7. Create a frame which displays your personal details with respect to a button click 8. Program to create a window with Text Fields and Buttons. The "ADD" button adds the two integers and displays the result. The "CLEAR" button shall clear all the text fields. 9. Program to create a window, when we press M or m, the windowdisplays"goodmorning",Aora,thewindowdisplays"GoodAft ernoon", E or e, the window displays "good evening", N or n, the window displays "goodnight". 10. Demonstrate the various mouse handling events using suitable example.

Year	I	**Course Code:** 2E2XXXM07T	**Credits**	04
Sem.	II	**Course Title:** Discrete Mathematics	**Hours**	52
Course Pre-requisites		NA		
Formative Assessment Marks:20		Summative Assessment Marks:80	Duration of ESA: 03hrs.	

Course Out comes	1. At the end of the course the student should be able to: 2. To understand the basic concepts of Mathematical reasoning, set and functions. 3. To understand various counting techniques and principle of inclusion and exclusions. 4. Understand the concepts of various types of relations, partial ordering and 5. Equivalence relations. 6. Apply the concepts of generating functions to solve the recurrence relations. 7. Familiarize the fundamental concepts of graph theory and shortest path algorithm

Unit No.	Course Content	Hours
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 Method sand Strategy. **Basic Structures:** Sets, Functions, Sequences, Sums, and Matrices: Sets, set operations, Functions.	13
UnitII	**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.	13

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.	13
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.	13
Recommended Learning Resources		

Reference Books:

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

ASSESSMENT METHODS

Formative Assessment for Theory

Evaluation Scheme for Internal Assessment: Continuous Internal Assessment (CIA)

Assessment Criteria for 20 marks		
1st Internal Assessment Test for 20 marks of 1 hour duration after 8 weeks and later marks should be reduced to 5	CIA : C1	5 Marks
2nd Internal Assessment Test for 40 marks 2 hours duration after 15 weeks and marks should be reduced to 10	CIA : C2	10 Marks
Assignment/ Activity	CIA : C3	05 Marks
	Total	20 Marks

Summative Assessment for Theory:

SEMESTER END EXAM : SEE	C4	80 Marks

Formative Assessment for Practical:

Assessment Criteria 10 marks		
Internal Test including basic understanding of the concept, Viva Voce, Journal. Test should be conducted for 50 marks and later it should be reduced for 10 marks	CIA : C1	10 Marks

Summative Assessment for Practical:

SEMESTER END EXAM : SEE	C2	40 Marks

Instruction to set the question paper.

1. Question number 1 has 12 sub questions consisting of 3 questions from each unit. Each question carries two marks. Student has to answer any ten questions.
2. Question number 2 to 7 are from unit I to IV.

    Each question carries five marks. Student has to answer any four questions
3. Question number 8 to 12 are from unit I to IV.

    Each question carries ten marks. Student has to answer any four questions

Question Paper pattern

**Bachelor of Computer Applications
Degree Examination**

Time: 3 hours   Max. Marks: 80

		Part- A	
1.		**Answer any <u>TEN</u> questions**	**10 x 2 = 20**
	a)		
	b)		
	c)		
	d)		
	e)		
	f)		
	g)		
	h)		
	i)		
	j)		
	k)		
	l)		
		Part-B	
		Answer any <u>Four</u> questions	**4 x 5 = 20**
	2		
	3		
	4		
	5		
	6		
	7		
		Part-C	
		Answer any FOUR questions	**4 X 10 = 40**
	8		
	9		
	10		
	11		
	12		