SILICON CITY COLLEGE, AUTONOMOUS
Re-Accredited by NAAC with 'A' Grade
Affiliated to Bengaluru North University

(Semester Scheme with Multiple Entry and Exit Options forUnder Graduate Course)

SYLLABUS AS PER NEP GUIDELINES

BACHELOR OF COMPUTER APPLICATION

Model Syllabus for 1st and 2nd Semesters

Academic Year 2023 - 2024

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 inIT 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 atan 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 solvingproblems, 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 programminglanguage installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

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

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

The objectives of the Programme are:

1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software

2. The course is designed to function as an intermediate between the industry and academic institutes.

3. The curriculum includes the latest technologies to prepare the student for the future. The student gains a strong foundation and skills in the field.

4. The infrastructure provides an excellent environment for the student to contribute effectively in the field.

5. It helps students analyze the requirements for system development and exposes students to business software and information systems

6. This course provides students with options to specialize in legacy application software, system software or mobile applications

7. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves

8. To provide opportunity for the study of modern methods of information processing and its applications.

9. To develop among students the programming techniques and the problem- solving skills through programming

10. To prepare students who wish to go on to further studies in computer science and related subjects.

11. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications.

12. Prepare the students with exceptional skills of problem solving, communication and leadership skills.

13. Facilitate overall understanding of the requirements of the subjects.

14. Provide a strong foundation in fundamentals of computers.

Program Outcomes: BCA (3 Years) Degree:

1. **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity

2. **Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.

3. **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.

4. **Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.

5. **Application Systems Knowledge**: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.

6. **Modern Tool Usage:** Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.

7. **Communication:** Must have a reasonably good communication knowledge both in oral and writing.

8. **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.

9. **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.

10. **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.

11. **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

Additional Program Outcomes: BCA Degree (Hons)

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

1. Apply standard Software Engineering practices and strategies in real -time software project development

2. Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics.

3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

4. The ability to apply the knowledge and understanding noted above to the analysis ofa given information handling problem.

5. The ability to work independently on a substantial software project and as an effective team member.

Model Curriculum for BCA

FIRST SEMESTER							
SL NO	Course Code	Title of the Course	Teaching Hours Per Week (L + T + P)	ESE	CIA	Total	Credits
1.	**CA23KN101**	Kannada	3 + 0 + 0	60	40	100	3
2.	**CA23HN101**	Hindi					
3.	**UG23GE101**	English	3 + 0 +0	60	40	100	3
4	**CA23DC101**	Fundamentals of Computers	3 + 0 + 0	60	40	100	3
5.	**CA23DC102**	Programming in C	3 + 0 + 0	60	40	100	3
6.	**CA23DC103**	Mathematical Foundation	3 + 0 + 0	60	40	100	3
7.	**CA23OE101**	Accounting For Everyone	3 + 0 + 0	60	40	100	3
8.	**UG23EV101**	Environmental Studies	3 + 0 + 0	30	20	50	2
9.	**UG23FC101**	Health and Wellness	0 + 0 + 2	-	25	25	1
10.	**UG23PE101**	Yoga	0 + 0 + 2	-	25	25	1
11.	**CA23DCP101**	Information Technology Lab	0 + 0 + 4	25	25	50	2
12.	**CA23DCP102**	Programming in C Lab	0 + 0 + 4	25	25	50	2
		TOTAL CREDITS		**440**	**360**	**800**	**26**

SL. NO.	COURSE CODE	TITLE OF THE COURSE	TEACHING HOURS PER WEEK (L + T + P)	ESE	CIA	TOTAL	CREDITS
SECOND SEMESTER							
1.	**CA23KN201**	Kannada	3 + 0 + 0	60	40	100	3
2.	**CA23HN201**	Hindi					
3.	**CA23GE201**	English	3 + 0 + 0	60	40	100	3
4.	**CA23DC201**	Object Oriented Concepts using JAVA	3 + 0 + 0	60	40	100	3
5.	**CA23DC202**	Data Structures using C	3 + 0 + 0	60	40	100	3
6.	**CA23DC203**	Discrete Mathematical Structures	3 + 0 + 0	60	40	100	3
7.	**CA23SB201**	Digital Fluency	1 + 0 + 2	30	20	50	2
8.	**CA23OE201**	Event Management	3 + 0 + 0	60	40	100	3
9.	**UG23PE201**	Sports	0+0+2	-	25	25	1
10.	**UG23EA101**	Extension Activities	-	-	25	25	1
11.	**CA23DCP201**	Object Oriented Concepts using JAVA Lab	0 + 0 + 4	25	25	50	2
12.	**CA23DCP202**	Data Structures using C Lab	0 + 0 + 4	25	25	50	2
		TOTAL CREDITS		**440**	**360**	**800**	**26**

Sl. No.	Course code	Title of the course	Teaching hours per week (l + t + p)	ESE	CIA	Total	Credits
THIRD SEMESTER							
1.	**CA23KN301**	Kannada	3 + 0 + 0	60	40	100	3
2.	**CA23HN301**	Hindi					
3.	**CA23GE301**	English	3 + 0 + 0	60	40	100	3
4.	**CA23DC301**	Database Management System	3 + 0 + 0	60	40	100	3
5	**CA23DC302**	C# AND Dotnet FRAME WORK	3 + 0 + 0	60	40	100	3
6.	**CA23DC303**	Computer Communication and Networks	3 + 0 + 0	60	40	100	3
7.	**UG23S0301**	Social Internship Activities	-	-	25	25	1
8.	**CA23IC301**	Indian Constitution	3+0+0	30	20	50	3
9.	**UG23PE301**	Yoga	0+0+2	-	25	25	1
10.	**CA23DCP301**	Database Management System Lab	0 + 0 + 4	25	25	50	2
11.	**CA23DCP302**	C# AND Dotnet FRAME WORK Lab	0 + 0 + 4	25	25	50	2
		TOTAL CREDITS		**380**	**320**	**700**	**24**

SL NO.	COURSE CODE	TITLE OF THE COURSE	TEACHING HOURS PER WEEK (L + T + P)	ESE	CIA	TOTAL	CREDITS
FOURTH SEMESTER							
1.	**CA23KN401**	Kannada	3 + 0 + 0	60	40	100	3
2.	**CA23HN401**	Hindi					
3.	**CA23GE401**	English	3 + 0 + 0	60	40	100	3
4.	**CA23DC401**	Python Programming	3 + 0 +0	60	40	100	3
5	**CA23DC402**	Computer Multimedia and Animation	3 + 0 + 0	60	40	100	3
6.	**CA23DC403**	Operating Systems Concepts	3 + 0 + 0	60	40	100	3
7.	**CA23OE401**	Advertising and Personal Selling	3 + 0 + 0	60	40	100	3
8.	**UG23PE401**	Physical Education	0 + 0 + 2	-	25	25	1
9.	**UG23EA401**	Extension Activity	0 + 0 + 2	-	25	25	1
10.	**CA23DCP401**	Python Programming Lab	0 + 0 + 4	25	25	50	2
11.	**CA23DCP402**	Computer Multimedia and Animation	0 + 0 + 4	25	25	50	2
		TOTAL CREDITS		**410**	**340**	**750**	**24**

FIFTH SEMESTER							
SL. NO.	COURSE CODE	TITLE OF THE COURSE	TEACHING HOURS PER WEEK (L + T + P)	ESE	CIA	TOTAL	CREDITS
1.	**CA23DC501**	Design and Analysis of Algorithm	4 + 0 + 0	60	40	100	4
2.	**CA23DC502**	Statistical Computing and R programming	4 + 0 + 0	60	40	100	4
3.	**CA23DC503**	Software Engineering	4 + 0 + 0	60	40	100	4
4.	**CA23VO101**	Vocational 1- Digital Marketing	3 + 0 + 0	60	40	100	3
5	**CA23OE501**	Cyberlaw and Cyber Security / Practical	2 + 0 + 0	30	20	50	2
6.	**CA23OE502**	Cloud Computing	3 + 0 + 0	60	40	100	3
7.	**UG23CO501**	Corporate Internship	-	-	25	25	1
8.	**UG23PE501**	Yoga	0+0+2	-	25	25	1
9.	**CA23DCP501**	Design & Analysis of Algorithms Lab	0 + 0 + 4	25	25	50	2
10.	**CA23DCP502**	R Programming Lab	0 + 0 + 4	25	25	50	2
		TOTAL CREDITS		380	320	700	**26**

SIXTH SEMESTER							
SL. NO.	COURSE CODE	TITLE OF THE COURSE	TEACHING HOURS PER WEEK (L + T + P)	ESE	CIA	TOTAL	CREDITS
1.	**CA23DC601**	Artificial Intelligence and Applications	3 + 0 + 0	60	40	100	4
2.	**CA23DC602**	PHP and MySQL	3 + 0 + 0	60	40	100	4
3.	**CA23DC603**	PROJECT					6
4.	**CA23DC604**	Fundamentals of Data Science	3 + 0 + 0	60	40	100	3
5	**CA23DC605**	Mobile Application Development	3 + 0 + 4	60	40	100	3
6.	**CA23DC606**	Web Content Management Systems	3 + 0 + 0	60	40	100	3
7.	**CA23SEC601**	Logical Reasoning	2 + 0 + 0	30	20	50	2
8.	**UG23PE601**	Yoga	0+0+2	-	25	25	1
9.	**CA23DCP602**	PHP and MySQL Lab	0 + 0 + 4	25	25	50	2
		TOTAL CREDITS					**28**

Semester: I

Course Code: CA23DC101	**Course Title:** Fundamentals of Computers
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	CIA: 40 MARKS
ESE: 60 MARKS	Exam Duration: 2 HRS 30 MTS

Course Outcomes (COs):

CO1: Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.

CO2: Basic organization of digital computer, units, Types of software's

CO3: Number System, Conversion from one number system to another number system, Boolean Algebra, computer codes, simple program, algorithm and flow chart.

CO4: Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting.

CO5: Databases, why databases are used, users.

CO6: Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching

CO7: Web Programming basics, introduction of HTML and CSS programming.

Course Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	2	2	2	2	1	2	2	2	2
CO2	1	2	2	2	2	2	2	2	2	2	2
CO3	1	2	2	2	2	2	2	2	2	2	2
CO4	2	2	2	2	1	2	2	2	2	2	2
CO5	2	2	2		2	2		2	2	3	3
CO6	1	2	2	2	2	2	2	2	2	3	3
CO7	2	2	2	3	2	2	2	2	3	3	3

Correlation Levels:

0: No Correlation   1: Slight (Low)   2: Moderate (Medium)   3. Substantial (High)

Course Title: Fundamentals of Computers	
Course Content	**Hours**
Unit – 1	
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; **Introduction to computers:** Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Super computers. **Anatomy of Computer:** Introduction, Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory works. Program execution with illustrative examples. Introduction to microcontrollers. **Types of Software** – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High-Level Languages, Translator Programs – Assembler, Interpreter and Compiler;	10
Unit – 2	
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, **k-map**; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples.	12
Unit-3	
Operating System Fundamentals: Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Microkernel Based Operating System, Booting.	12
Unit-4	
Introduction to Database Management Systems: Database, DBMS, Database -File system vs DBMS, Database applications, Database users.	5

Unit-5	
Internet Basics: Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System. **Web Basics:** Introduction to web, web browsers, http/https, URL, HTML5, CSS.	6

Text Books:

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

Reference:

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

Course Code: **CA23DCP101**	**Course Title: Information Technology Lab**
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	CIA: 25 Marks
ESE: 25 Marks	Exam Duration: 03 Hours

Programs:

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 …)

8. Activities using Word Processor Software

9. Activities using Spreadsheets Software

10. Activities using Presentation Software

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

12. Tasks involving Internet Browsing

13. Flow charts: Installation and using of flowgarithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), arrays and recursion.

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

Reference:

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

Web References:

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

Evaluation Scheme for Lab Examination

Evaluation component	Maximum marks
Writing Two Programs	10
Execution of one program	10
Viva-Voice	05
Total	**25**

Course Code: **CA23DC102**	Course Title: **Programming in C**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	CIA: 40
ESE: 60 Marks	Exam Duration: 02 HRS 30 MTS

Course Outcomes (COs):

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

CO1: Read, comprehend, and follow the execution of programs written in the C language.

CO2: Write the C code for a given problem.

CO3: Perform input and output operations using programs written in C.

CO4: Understand the working of Hardware and Software and importance of Operating systems.

CO5: Understand Programming Languages, Number Systems, Peripheral Devices, Networking, Multimedia, and Internet Concepts.

Course Mapping:

	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1	3	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	3	3	3	2	3	3	3	3
CO 3	3	2	2	3	3	3	3	3	2	2	3
CO 4	3	2	3	2	3	3	3	3	3	3	3
CO 5	3	3	2	3	3	3	3	2	2	2	3
CO 6	3	3	3	3	3	3	3	3	3	3	3
CO 7	3	3	3	3	3	3	3	2	3	3	3

Correlation levels:

0- No Correlation   1-Slight (Low)   2-Moderate (Medium)   3-Substantial (High)

Course Content	Hours
Unit – 1	
Introduction to C Programming: Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. **C Programming Basic Concepts:** C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants. **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 – 2	
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 - S*imple 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 – 3	
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.	8
Unit – 4	
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;	5

Unit – 5	
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. **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.	10

TEXT BOOKS:

1. C: The Complete Reference, By Herbert Schildt ,4th edition, McGraw Hill Education.
2. C Programming Language, By Brain W. Kernighan, 2nd edition, Pearson Publications.
3. Kernighan & Ritchie: The C Programming Language (PHI)
4. E. Balaguruswamy: Programming in ANSI C (TMH)

Reference Books:

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

Course Code: **CA23DCP102**	Course Title: **C Programming Lab**
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	CIA:25 Marks
ESE Marks: 25	Exam Duration: 03 Hours

Programs

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

13 Program to find the length of a string without using built in function

14 Program to demonstrate string functions.

15. Program to demonstrate pointers in C

16. Program to check a number for prime by defining isprime( ) function

17. Program to read, display and to find the trace of a square matrix

18. Program to read, display and add two m x n matrices using functions

19. Program to read, display and multiply two m x n matrices using functions

20. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.

21. Program to Reverse a String using Pointer

22 Program to Swap Two Numbers using Pointers

23 Program to demonstrate student structure to read & display records of n students.

24 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

Evaluation component	Maximum marks
Writing Two Programs	10
Execution of one program	10
Viva-Voice	05
Total	**25**

Course Code: **CA23DC103**	Course Title: Mathematical Foundation
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	CIA: 40
ESE: 60 Marks	Exam Duration: 02 HRS 30 MTS

Course Outcomes (COs):

CO1: Learn the basic concepts of Mathematical reasoning, set and functions

CO2: Examine and resolve problems with connectives, predicates, and quantifiers in various situations.

CO3: Learn the fundamentals of matrices and how to use Cramer's rule to solve equations.

CO4: Understand the concept of Eigen values.

CO5: Understand the concept of derivatives and know different applications of derivatives.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	1	1	0	0	1	1	1	1	1
CO2	1	1	1	2	0	1	1	1	1	2	2
CO3	2	1	1	1	0	0	1	1	1	1	3
CO4	1	2	1	2	1	1	1	1	1	1	3
CO5	1	1	1	2	1	1	1	1	1	1	2

Correlation levels: 0- No correlation; 1-Slight (Low);   2-Moderate (Medium);

3- Substantial (High)

Course Content	Hours
Unit - 1	
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 - 2	
Operations on sets: power set- Venn diagram Cartesian product-relations - functions- types of functions - composition of functions.	10
Unit - 3	
Matrix algebra: Matrices and Determinants: Matrices-Definition, types of matrices, addition, subtraction, scalar multiplication and multiplication of matrices. Determinants: Definition, minors, cofactors, Adjoint of a matrix, Cayley Hamilton theorem(without proof), Eigen values and Eigen vectors, inverse of a matrix using Cayley Hamilton simultaneous equations using Cramer's rule and matrix inversion method.	10
Unit - 4	
Matrix: finding rank of a matrix - normal form-echelon form Cayley Hamilton theorem-Eigen values	7
Unit - 5	
Differential calculus: Functions and limits - Simple Differentiation ofAlgebraic Functions – chain rule, derivatives of composite function, logarithmic and exponential differentiation, and successive differentiation (second order)– Maxima and Minima	8

Text Books:

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

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

Course Code: **C23OE101**	Course Title: Accounting for Everyone
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	CIA: 40
ESE: 60 Marks	Exam Duration: 02 HRS 30 MTS

Course Outcomes:
On successful completion of the course, the students will be able to acquire basic knowledge on financialaccounting and to impart preliminary skills for recording various kinds of financial transactions.
Syllabus

Module: 1 – Introduction to Accounting   12 Hrs

Accounting – Meaning, Importance and Need, Its objectives and relevance to business establishments and otherorganizations and individuals; Accounting Concepts & Conventions Some Basic Terms –Transaction, Account, Asset, Liability, Capital, Expenditure & Expense, Income, Revenue, Gain,Profit, Surplus, Loss, Deficit. Debit, Credit, Accounting Year, Financial Year.

Module: 2 – Recording of Transactions   14 Hrs

Transactions and recording of transactions Features of recordable transactions and events, Recording of transactions:Personal account, Real Account and Nominal Account; Rules for Debit and Credit;
Double Entry System, journalizing transactions; Preparation of Ledger – Simple problems

Module: 3 – Final Accounts of Sole Proprietorship Concerns   14 Hrs

Fundamental Accounting Equation; Preparation of Trial Balance; Concept of revenue and Capital; Preparation ofTrading and Profit & Loss Account, Balance Sheet

Module: 4 – Computerized Accounting   05 Hrs

Introduction to Computerized Accounting Systems: Introduction to popular accounting softwares

Skill Developments Activities:
- Prepare a set of Final Accounts with imaginary figures
- List out the popular Accounting Software in practice
- Visit an outlet near your place and understand the process of accounting followed

Reference Books:
1. Hatfield, L - Accounting Basics - Amazon Digital Services LLC.
2. Dr. Muralidhar S & others – Basics of Financial Accounting – Kalyani Publishers
3. Horngren, C. T., Sundem, G. L., Elliott, J. A., & Philbrick, D - Introduction to FinancialAccounting - Pearson Education
4. Siddiqui, S. A - Book Keeping &Accountancy -Laxmi Publications Pvt. Ltd.
5. Sehgal, D - Financial Accounting -Vikas Publishing House Pvt. Ltd
6. Tulsian, P. C - Financial Accounting - Tata McGraw Hill Publishing Co. Ltd.
7. Mukharji, A., & Hanif, M - Financial Accounting - Tata McGraw Hill Publishing Co. Ltd.
8. Maheshwari, S. N., Maheshwari, S. K., & Maheshwari, S. K - Financial Accounting - VikasPublishing House Pvt. Ltd
9. Mukherjee, S., & Mukherjee, A. K - Financial Accounting - Oxford University Press
10. Jain, S. P., & Narang, K. L – Financial Accounting – Kalyani Publishers

Course Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 1	3	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	3	3	3	2	3	3	3	3
CO 3	3	2	2	3	3	3	3	3	2	2	3
CO 4	3	2	3	2	3	3	3	3	3	3	3
CO 5	3	3	2	3	3	3	3	2	2	2	3
CO 6	3	3	3	3	3	3	3	3	3	3	3
CO 7	3	3	3	3	3	3	3	2	3	3	3

Correlation levels:

0- No Correlation   1-Slight (Low)   2-Moderate (Medium)   3-Substantial (High)

II SEMESTER

Course Code: **CA23DC201**	**Course Title: Object Oriented Programming with JAVA**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	CIA: 40 Marks
ESE: 60 Marks	Exam Duration: 2 HRS 30 MTS

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:
- Understand the features of Java and the architecture of JVM.
- Write, compile, and run Java programs that may use basic data types, control flow constructs, and how type casting works.
- Identify classes, objects, members of a class, and relationships among them that are needed for a specific problem.
- Showcase the concepts of polymorphism and inheritance.
- The students will be able to: Write, compile, and run Java programs that include GUIs and event-driven programming as well as programs based on files.
- They will also be able to demonstrate programs based on interfaces and threads
- Explain the advantages of JAVA's exceptional handling mechanism compared to other programming languages.

Course Content	Hours
Unit – 1	
Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.	6
Unit – 2	
Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.	6
Unit – 3	
Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	10
Unit – 4	
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,	10

	Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism**.**	
Unit – 5		
	I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O,Random Access Files.	6
Unit – 6		
	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.	7

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1	3	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	3	3	3	2	3	3	3	3
CO 3	3	2	2	3	3	3	3	3	2	2	3
CO 4	3	2	3	2	3	3	3	3	3	3	3
CO 5	3	3	2	3	3	3	3	2	2	2	3
CO 6	3	3	3	3	3	3	3	3	3	3	3
CO 7	3	3	3	3	3	3	3	2	3	3	3

Correlation levels: 1-Slight (Low)   2-Moderate (Medium)   3-Substantial (High)

Text Books:

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

Reference Books:

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

Course Code: **CA23DC202**	**Course Title: Data Structures using C**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	CIA: 40 Marks
ESE: 60 Marks	Exam Duration: 02 HRS 30 MTS

Course Outcomes (COs):

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

CO1: Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms

CO2: Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs

CO3: Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs

CO4: Demonstrate different methods for traversing trees

CO5: Compare alternative implementations of data structures with respect to performance

CO6: Describe the concept of recursion, give examples of its use

CO7: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.

Course Content	Hours
Unit – 1	
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.* Algorithm Specification, Performance Analysis, Performance Measurement Recursion: Definition; Types of recursions; Recursion Technique Examples - GCD, Binomial coefficient $^{n}C_{r}$, Towers of Hanoi; Comparison between iterative and recursive functions.	9
Unit - 2	
Arrays: Basic Concepts – Definition, Declaration, Initialization, Operations on arrays; Types of arrays; Arrays as abstract data types (ADT); Representation of Linear Arrays in memory; Traversing linear arrays; Inserting and deleting elements; Sorting – Selection sort, Bubble sort, Quick sort, Selection sort, Insertion sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching;	10

Multidimensional arrays;Representation of multidimensional arrays; Sparse matrices.	
Unit - 3	
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,	9
Unit - 4	
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.	5
Unit – 5	
Queues: Basic Concepts – Definition and Representation of queues; Types of queues - Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues;	4
Unit - 6	
Trees: Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth; **Binary tree:** Type of binary trees - strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; preorder, inorder and postorder traversal;	8

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	2	2	2	2	2	2	3	2	2
CO2	1	2	2	2	2	2	2	2	3	2	2
CO3	1	2	2	2	2	2	2	2	2	3	3
CO4	2	2	2	2	3	2	2	3	3	3	3
CO5	2	2	2	2	2	2	2	2	2	3	3
CO6	2	2	2	2	2	2	2	2	3	3	3
CO7	3	2	3	3	3	2	3	3	3	3	3

Correlation Levels:

0: No Correlation   1: Slight (Low)   2: Moderate (Medium)   3. Substantial (High)

Text Books

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

References

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

Course Code: **CA23DC203**	Course Title: Discrete Mathematics
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	CIA: 40 Marks
Exam Marks: 60	Exam Duration: 02 HRS 30 MTS

Course Outcomes (COs):

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

CO1: To find the probabilities of events.

CO2: To understand various counting techniques and principle of inclusion and exclusions.

CO3: Understand the concepts of various types of relations, partial ordering and equivalence relations.

CO4: Apply the concepts of generating functions to solve the recurrence relations.

CO5: Familiarize the fundamental concepts of graph theory and shortest path algorithm.

Course Content	Hours
Unit - 1	
The Foundations: Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy. **Basic Structures**: Sequences, Sums, and Sequences and Summations. **Probability** Basic concepts- Trail, Sample space, Event, Types of events; Definitions of probability; Addition and multiplication rules of probability; Conditional probability; Baye's theorem; Random variables; Expectation.	14
Unit - 2	
Counting: Basics of counting, Pigeonhole principle, Permutation and combination, Binomial Coefficient and Combination, Generating Permutation and Combination**.** **Advanced Counting Techniques**: Applications of Recurrence Relations, Solving Linear Recurrence, Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion-exclusion.	10

	Unit - 3	
	Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Corrections. Relation: Properties of relation, Composition of relation, Closer operation on relation, Equivalence relation and partition. Operation on relation, Representing relation.	11
	Unit - 4	
	Graphs: Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.	10

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	1	1	1	0	0	1	0	0	2	2
CO2	1	1	2	0	0	1	1	1	0	1	1
CO3	2	1	1	1	0	0	1	1	1	1	2
CO4	1	2	1	2	1	1	1	1	1	1	3
CO5	1	1	1	2	1	1	1	1	1	1	2
CO6	1	2	2	2	2	3	1	2	2	2	2

Correlation levels:

0- No correlation; 1-Slight (Low);   2-Moderate (Medium);
3- Substantial (High)

Text Book:

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

References:

2. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross,2003.

3. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI 1986.

4. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5 Edition.

5. Discrete Mathematical Structures, Trembley and Manohar.

Course Code: **CA23DCP201**	**Course Title:** Object Oriented Concepts using JAVA Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	CIA: 25 Marks
ESE: 25	Exam Duration: 03 Hours

Programs:

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.

7. 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.

8. 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)

9. 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.

10. 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.

11. 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.

12. 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.

13. 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

14. 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.

15. 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

16. 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.

17. 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

18. Program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.

19. Program to handle Null Pointer Exception and use the "finally" method to display a message to the user.

20. Program which create and displays a message on the window

21. Program to draw several shapes in the created window

22. Program to create an applet and draw grid lines

23. 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.

24. Create a frame which displays your personal details with respect to a button click

25. Create a simple applet which reveals the personal information of yours.

26. Program to move different shapes according to the arrow key pressed.

27. 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

28. Demonstrate the various mouse handling events using suitable example.

29. Program to create menu bar and pull-down menus.

Evaluation Scheme for Lab Examination

Evaluation component	Maximum marks
Writing Two Programs	10
Execution of one program	10
Viva-Voice	05
Total	**25**

Course Code: **CA23DCP202**	Course Title: Data Structures Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	CIA: 25
ESE: 25	Exam Duration: 03 Hours

Programs:

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.
11. Program to sort the given list using insertion sort technique.
12. Program to sort the given list using quick sort technique.
13. Program to sort the given list using merge sort technique.
14. Program to search an element using linear search technique.
15. Program to search an element using recursive binary search technique.
16. Program to implement Stack.
17. Program to convert an infix expression to postfix.
18. Program to implement simple queue.
19. Program to implement linear linked list.
20. Program to display traversal of a tree.

Evaluation Scheme for Lab Examination

Evaluation component	Maximum marks
Writing Two Programs	10
Execution of one program	10
Viva-Voice	05
Total	**25**