SYLLABUS OF

Bachelor of Computer Application

PROGRAM

BCA First Semester

Department of Computer Science & IT

Mangaldai College (Autonomous)

Semester-I		
Course Code	**Course**	**T+P (Credit)**
Code: BCA-DSC-10014	**Programming and Problem Solving**	**3+1=4**
Code: BCA-DSC-10024	**Mathematics I**	**4**
Code: BCA-SEC-10013	**Computer Fundamentals and Application Software**	**2+1=3**
	Languages /Alt. English	**4**
	MDC-1	**3**
	VAC-1	**2**
		20

Course Informatio		
Course Title	:	**Programming and Problem Solving**
Course Code	:	*BCA-DSC-10014*
Programme	:	Bachelor of Computer Applications (BCA)
Semester / Year	:	BCA 1st Semester
Credits	:	3+1
Marks	:	**Theory: 75** Internal: 30 ESE : 45 **Practical: 25** Internal: 10 ESE : 15
Contact Hours	:	Theory: 30 hrs. (30 classes) Practical: 30 hrs. (15 classes)
Course Objectives	:	✓ To understand the fundamentals of programming concepts and the syntax, structure, and execution model of the C programming language. ✓ To develop problem-solving skills using C constructs such as data types, operators, control statements, arrays, strings, and functions. ✓ To gain practical knowledge of memory management using pointers, dynamic allocation, structures, and unions. ✓ To learn file handling techniques in C for reading, writing, and managing data using text and binary files.
Course Outcomes (COs)	:	**CO1:** Apply basic programming concepts to write, compile, and execute C programs effectively. **CO2:** Use appropriate data types, operators, and expressions to solve computational problems in C. Implement decision-making, looping constructs, arrays, strings, and functions for structured program development. **CO3:** Demonstrate the use of pointers, dynamic memory allocation, structures, and unions in C programs. Perform file handling operations to store, retrieve, and manage data using text and binary files in C.
Recommended Books & References	:	**V. Rajaraman** – *Fundamentals of Computers* **P. K. Sinha & Priti Sinha** – *Computer Fundamentals*

Course Content / Units

A. Theory		Class	Marks
Unit 1:	**Basics of C Programming** Introduction to programming languages- High-level vs low level languages, compiled vs interpreted languages. Structure of a C program. Introduction to Header files. Main function and a simple program execution. Compiling and executing a program. C tokens – keywords, identifiers, constants, operators. Statements and expressions in C. Basic data types in C - integers, floats, doubles, characters. Void. Size and range of values of data types. Variables. Constants. Declaration and initialization of variables and constants. Assigning values to variables. Operators in C – binary and unary operators. Arithmetic, assignment, logical, comparison, bitwise and conditional operators. Order of precedence of operators. Associativity of operators. Input and output statements – getchar(), getc(), getch(), putchar(), putc(), puts(), scanf(), printf(), format specifiers. Typecasting.	**8**	**12**
Unit 2:	**Control Statements and Arrays** Basic programming logic using sequence, selection and repetition. Decision-making statements such as if, if-else, nested if and switch-case. Looping statements using for, while and do-while loops. Use of break, continue and goto statements. Introduction to arrays, declaring and initializing arrays, accessing array elements and simple use of two-dimensional arrays.	**6**	**10**
Unit 3:	**Strings and Functions** Introduction to strings and their use in C. Declaring and initializing strings. String input and output and common string functions. Introduction to functions, writing and calling functions. Function arguments and return values. Call by value and call by reference. Passing arrays to functions. Basic idea of recursion.	**6**	**10**
Unit 4:	**Pointers and Memory Management** Basic concept of pointers and memory addresses. Declaring and using pointers. Relationship between pointers and arrays. Introduction to dynamic memory allocation using malloc() and calloc().	**5**	**8**
Unit 5:	**Structures, Unions and File Handling** Introduction to structures and unions. Declaring and using structures, arrays of structures and nested structures. Difference between structures and unions. Introduction to file handling in C. Opening and closing files. Reading from and writing to text files. Basic idea of binary files and random file access.	**5**	**5**

B. **Practical / Lab**	Class	Marks
List of Practical's	**30**	**15**

(This is a suggestive list only. Questions need not be restricted to this list. These practical's are advised to be performed in Linux environment)

1. Write a program in C to print "Hello World"
2. Write a program to take input of two numbers and print their sum, product, difference.
3. Write a program to find the smallest or greatest of three numbers given as input.
4. Write a program to print the sum and product of digits of an integer.
5. Write a program to take a number representing a month and print the name of the month using switch case.
6. Write a program that calculates the grade of a student based on their marks in a subject using nested if-else statements. Also print the range of marks for each grade using switch case.
7. Write a program to take a number as input and print all the even numbers up to that number using while and for loop.
8. Write a program to ask the user for an input to stop a loop or continue repeating after printing the iteration count using a do-while loop.
9. Write a program to find the maximum, minimum, sum and average of n numbers without using array.
10. Write a program that takes two integers as input and finds their greatest common divisor (GCD) using nested while loops and if statements.
11. Write a program that calculates the sum of the first n terms of the Fibonacci sequence, where n is entered by the user, using a for-loop.
12. Write a program that takes an integer as input and checks if it is a prime number. Write a program that calculates the sum of the first n terms of an arithmetic series, where n, the first term and common difference of the series are entered by the user.
13. Write a program to compute the sum of the first n terms of the following series S =1-2+3-4+5……
14. Write a program to create an array with inputs from the user and print the same.
15. Write a program to perform following actions on an array entered by the user:
16. Print the even-valued elements
17. Print the odd-valued elements
18. Print the array in reverse order
19. Write a program to take a matrix from the user and print the transpose of the same.
20. Write a program to ask for the name of the user and print the same.
21. Write a program to take a string of length more than 10 and find the number of vowels in the string. Also print the position of the vowels in the string.
22. Write a program using pointers to copy a string to another string variable without using library function.
23. Write a program that swaps two numbers using pointers.
24. Write a program to calculate Factorial of a number (i) using recursion, (ii) using iteration

***NB**: Presentation and assignment copy submission at the end of the course completion*

Course Information		
Course Title	:	Mathematics I
Course Code	:	BCA-DSC-10024
Programme	:	Bachelor of Computer Applications (BCA)
Semester / Year	:	BCA 1st Semester
Credits	:	4
Contact Hours	:	Theory: 60 hrs. (60 classes)
Marks	:	**Theory: 100** Internal: 40 ESE : 60
Course Objectives	:	✓ To introduce the fundamental concepts of sets, relations and functions, including their properties and operations. ✓ To develop an understanding of the principles of counting, inclusion–exclusion and mathematical induction, and to apply them to solve problems. ✓ To analyse the growth of functions and explain asymptotic notations used in algorithm analysis. ✓ To understand matrix operations and their applications in solving systems of linear equations. ✓ To build logical reasoning skills by solving problems based on mathematical logic, including connectives, truth tables, tautologies, contradictions and inference.
Course Outcomes (COs)	:	**CO1** Define and apply concepts of sets, relations and functions. **CO2** Apply principles of counting, inclusion–exclusion and mathematical induction to solve problems. **CO3** Analyse growth of functions using asymptotic notations. **CO4** Perform matrix operations and solve systems of linear equations. **CO5** Analyse logical statements using propositional and predicate logic.
Recommended Books & References	:	**Discrete Mathematics** — *Dr. J.K. Sharma* **Discrete Mathematics** — *Narasimha Karumanchi* **Graph Theory with Applications** — *Bondy & Murty*

Course Content / Units			
A. Theory		**Class**	**Marks**
Unit 1:	**Sets, Relations and Functions** **Sets**: definition of sets, cardinality of sets, finite, countable and infinite sets, operations on sets and Venn diagrams, multisets. **Relations**: definition and properties of binary relations, closures of relations, equivalence relations, equivalence classes and partitions, n-array relations and their representation, partial ordering relations and lattices. **Functions**: definition of functions, one-to-one and onto functions.	**16**	**16**
Unit 2:	**Principles of Counting and Mathematical Induction** Basics of counting principles, principle of inclusion–exclusion and its applications, mathematical induction, pigeonhole principle and its applications, permutations and combinations, circular permutations, permutations and combinations with repetitions, permutations of sets with indistinguishable objects.	**15**	**15**
Unit 3:	**Growth of Functions and Asymptotic Notations** Asymptotic behaviour of functions, asymptotic notations including Big-O and Theta, summation formulas and properties, bounding summations.	**5**	**5**
Unit 4:	**Matrices** Definition and types of matrices (such as identity and diagonal matrices), row and column operations, vectors and matrices, addition, subtraction and multiplication of matrices, properties of matrix operations, additive and multiplicative identity, additive inverse of a matrix, representation of relations using matrices, transpose of a matrix and its properties, symmetric and skew-symmetric matrices, elementary transformations, determinants, rank of a matrix, invertible matrices, solution of systems of linear equations, basic concepts of eigenvalues and eigenvectors.	**12**	**12**
Unit 5:	**Mathematical Logic** Connectives, truth tables, tautologies and contradictions, equivalence and implications, NAND and NOR, normal forms (CNF and DNF) and conversion, theory of inference, propositional calculus, introduction to predicate calculus, predicates and quantifiers.	**12**	**12**

Course Information		
Course Title	:	Computer Fundamentals and Software Application
Course Code	:	BCA-SEC-10013
Programme	:	Bachelor of Computer Applications (BCA)
Semester / Year	:	BCA 1st Semester
Credits	:	2+1
Marks	:	**Theory: 50** Internal: 20 ESE : 30 **Practical: 25** Internal: 10 ESE : 15
Contact Hours	:	Theory: 30 hrs. (30 classes) Practical: 30 hrs. (15 classes)
Course Objectives	:	✓ To introduce students to **basic computer concepts and components**. ✓ To develop skills in using **operating systems and application software.** ✓ To enable students to create documents, spreadsheets, and presentations. ✓ To build **digital literacy** for academic and everyday use.
Course Outcomes (COs)	:	**CO1:** Understand **basic computer concepts**, components, generations, data representation, and **number system conversions.** Explain **memory concepts**, types of RAM and ROM, storage devices, registers, cache, and **memory hierarchy.** **CO2:** Understand **programming language basics**, translators, algorithms, flowcharts, and **software concepts including operating systems.** **CO3:** Use **word processing, spreadsheet, and presentation tools** to create documents, analyze data, and prepare presentations. Apply practical skills to perform **basic computer operations and office automation tasks.**
Recommended Books & References	:	**V. Rajaraman** – *Fundamentals of Computers* **P. K. Sinha & Priti Sinha** – *Computer Fundamentals*

Course Content / Units

A. Theory		Class	Marks
Unit 1:	**Introduction to Computers and Number Systems** Definition of computer, basic components of computer, bus, evolution of computers, Generations of computers, classification of computers, data representation in a computer, ASCII, Unicode, Number system: decimal, binary, octal and hexadecimal number system, conversion among number systems.	**7**	**7**
Unit 2:	**Memory and Storage Devices** Definition of Memory, types of memory, types of RAM, types of ROM, Secondary storage devices: Magnetic storage, Optical Storage, SSD, Flash memory, Registers: Special purpose and General-purpose registers, Cache memory, memory hierarchy.	**5**	**5**
Unit 3:	**Input devices and Output devices** Input device: keyboard, keyboard layouts, pointing devices, mechanical and optical mouse, scanner, hand-held and flat-bed scanners, OMR, OCR, MICR, digital camera, touchpad, trackball, joystick, digitizer, digital microphone, Output devices: CRT, LCD, LED, plasma monitor, printers: impact printers, non-impact printers, dot matrix printers, inkjet printers, laser printers, thermal printers, plotters, voice output systems, projector.	**5**	**5**
Unit 4:	**Programming language basics and Software** Programming language: definition of program, types of programming languages, language translator: assembler, interpreter, compiler, definition of pseudocode, algorithm, flowchart, Software: definition of software, types of software, example of application and system software, definition of Operating system, proprietary and open-source software, examples of proprietary and open-source software.	**5**	**5**
Unit 5:	**Word processing, Spreadsheet and Presentation** **Word Processing:** Word interface and shortcuts, document creation and formatting, fonts and paragraphs, page setup, headers and footers, tables and images, mail merge, document security and printing. **Spreadsheet:** Excel interface, data entry and formatting, formulas and functions, sorting and filtering, charts, data validation, PivotTables and printing. **Presentation:** PowerPoint interface, slide creation and design, themes and layouts, multimedia content, animations and transitions, charts and slide show.	**8**	**8**

B. Practical / Lab	Class	Marks
List of Practical's 1. Basic computer operations and use of keyboard shortcuts 2. Creating and formatting a document in MS Word 3. Working with tables, images, headers and footers in Word 4. Mail merge for letters or labels 5. Creating and formatting worksheets in MS Excel 6. Using formulas and functions (SUM, AVERAGE, VLOOKUP) 7. Designing a presentation using MS PowerPoint	**30**	**15**

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