

Semester-I

S No	Course Code	Course	Course Type	L	T	P	Credits
1.	CAPC1122M	Digital Electronics	Major	4	0	2	6
2.	ACPC1122N	Elements of Computer Science	Minor	4	0	2	6
3.	CAP022I	Introduction to Computing <i>(offered for other Majors)</i>	MD	2	1	0	3
4.	CAP122S	Web Developer-I: Internet Basics and HTML <i>(offered for other Majors and Computer Applications)</i>	SEC	2	0	2	2
5.	DTS022	VAC <i>(for BCA from other Majors)</i> Digital and Technological Solutions <i>(offered for other Majors)</i>	VAC	2	0	0	2
6.	CNS022A/ URM022A/ ENL022A	Communication skill / Modern Indian language / English Language <i>(offered by other Departments)</i>	AEC	3	0	3	3

Semester-II

S No	Course Code	Course	Course Type	L	T	P	Credits
1.	CAPC1222M	Mathematics for Computer Science	Major	4	2	0	6
2.	ACPC1222N	Programming in C	Minor	4	0	2	6
3.	CAP022I	Introduction to Computing <i>(offered for other Majors)</i>	MD	2	1	0	3
4.	CAP122S	Web Developer-II: Java Script and CSS Basics <i>(offered for other Majors and Computer Applications)</i>	SEC	2	0	2	2
5.	CAP122V	VAC <i>(for BCA from other Majors)</i> Digital and Technological Solutions <i>(offered for other Majors)</i>	VAC	2	0	0	2
6.	CNS022A/ URM022A/ ENL022A	Communication skill / Modern Indian language / English Language <i>(offered by other Departments)</i>	AEC	3	0	3	3

Course Type: - Major
Paper Title: - DIGITAL ELECTRONICS
Credit Weightage: - THEORY -04; PRACTICALS- 02

Semester: - 1st
Paper Code: - CAPC1122M
Batch: - 2023

Course Objective:

- Familiarize students with different number systems and coding schemes used in digital systems.
- Provide students with a strong foundation in digital logic concepts, including binary representation, Boolean algebra, truth tables, and logic gates.
- Teach students how to manipulate Boolean expressions, perform algebraic manipulations, and simplify logic circuits using algebraic laws and theorems.
- Enable students to analyse and design combinational circuits using various techniques such as Karnaugh maps, Boolean minimization, and multiplexers.
- Introduce students to digital systems, including memory elements.

Course Outcomes:

- Demonstrate a clear understanding of binary number systems, logic gates, and Boolean algebra.
- Analyse and design combinational logic circuits using various methods like truth tables, Karnaugh maps, and Boolean algebra.
- Apply the principles learned to design basic digital systems to meet specific requirements.
- Understand the principles of sequential logic, including flip-flops and timing considerations.

UNIT – I

BOOLEAN ALGEBRA AND LOGIC GATES: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic. Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

UNIT – II

GATE – LEVEL MINIMIZATION: The map method, Four-variable map, Sum of products & product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations and Exclusive OR function.

UNIT – III

COMBINATIONAL LOGIC: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers shift Registers, Ripple counters, synchronous counters, other counters.

UNIT – IV

MEMORIES AND ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array & programmable Array logic, Sequential Programmable Devices. Introduction to Integrated Circuits and digital Logic Families.

TEXT BOOKS:

1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.

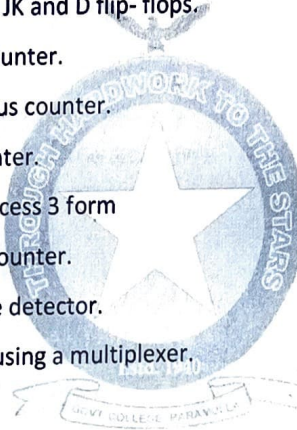
REFERENCES:

2. Digital Fundamentals, Thomas L. Floyd.
3. Digital Logic Circuits, R. P. Jain.
4. Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw Hill Edition.
5. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
6. NPTEL Digital Electronics Course @ <https://nptel.ac.in/courses/117106086>
7. SWAYAM Digital Electronics Course @ https://onlinecourses.swayam2.ac.in/cec20_cs35/preview

LAB WORK - DIGITAL ELECTRONICS (CAPC1122M)

List of Experiments/ Simulations:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip-flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement a control circuit using a multiplexer.



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Course Objective: To provide an overview of the subjects of computer science.

Course Outcomes:

- Know the working principles of functional units of a basic Computer
- Understand program development and the use of algorithms in problem solving.
- Know the need and types of operating system & database systems.
- Understand the significance of networks, internet, WWW and cyber security.
- Understand Autonomous systems and the applications of artificial intelligence.

UNIT – I

BASICS OF A COMPUTER – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – Systems software, application software, packages, frameworks, IDEs.

UNIT – II

OFFICE PRODUCTIVITY TOOLS -word processing, spreadsheets and Presentation Graphics Software. Software development – Software development life cycle (SDLC), Types of computer languages – Programming, steps in program development, flowcharts and algorithms.

UNIT – III

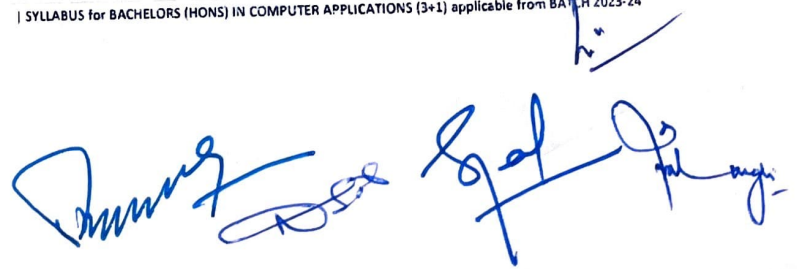
OPERATING SYSTEMS: Functions of operating systems, types of operating systems, Device & Resource Management.
DATABASE MANAGEMENT SYSTEMS: Data, information, databases and database management systems, data centres and Cloud services.
COMPUTER NETWORKS: Advantages of computer networks, LAN, WAN, MAN, internet, Wi-Fi, sensor networks, vehicular networks, 5G communication.

UNIT – IV

WORLD WIDE WEB : Concept of a HTML, web page & Website. Web Browsers, Web servers, Search Engines; Understanding URL; Domain name; IP Address; Using e-governance website, social media, Online Social networks.
SECURITY – information security, cyber security, cyber laws.
AUTONOMOUS SYSTEMS: IOT, Robotics, Block chain, Drones, Artificial Intelligence – Learning, Game Development, natural language processing, image and video processing. Cloud Basics.

TEXT & REFERENCES:

1. Invitation to Computer Science, -G. Michael Schneider | Judith L. Gersting, Cengage Learning.
2. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
3. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
4. Computer Fundamentals, P K Sinha 8th Edition, BPB Publishers.
5. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
6. Fundamentals of Computers, VRajaraman 6th edition PHI Learning Private Limited.
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft).



LAB WORK -ELEMENTS OF COMPUTER SCIENCE (ACPC1122N)

- Task-1.* Disassemble and assemble the PC back to working condition (A video be provided as part of the course content).
- Task-2.* Installation of MS windows & Linux as dual boot on a PC.
- Task-3.* Linux command line interface (CLI) and its essential commands.
- Task-4.* Access Internet via LAN and configuration of various TCP/IP settings.
- Task-5.* Customize a web browser with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.
- Task-6.* Use of Search engines and Netiquette.
- Task-7.* Computer/ Web Browser Customization for Enhanced Internet Safety (Blocking of pop ups/active x downloads to avoid viruses).
- Task-8.* USING MS WORD: Formatting Fonts in word, Drop Cap, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Using Date and Time option. Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
- Task-9.* Creating a Newsletter in MS Word: Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge.
- Task-10.* USING MS EXCEL (Features to be covered) – Accessing, overview of toolbars, saving excel files, Using help and resources. Gridlines, Format Cells, Summation, auto fill, Formatting Text. Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, hyper linking, Count function, LOOKUP/VLOOKUP. Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.
- Task-11.* USING MS POWERPOINT (Features to be covered): PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint. Interactive presentations -Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts. Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc.), and Inserting – Background, textures, Design Templates, Hidden slides.
- Task-12.* Utilizing Collaboration/Teamwork Tools for Enhanced Productivity (Features to be covered): Familiarization with collaboration and teamwork tools such as Google Drive, Microsoft OneDrive, and DropBox. Exploration of various features offered by these tools, including document collaboration, version control, file sharing and permissions, real-time communication, and offline access and syncing.
- Task-13.* Exploration of basic IoT Devices and Sensors.

Course Type: - Major
Paper Title: - MATHEMATICS FOR COMPUTER SCIENCE
Credit Weightage: - THEORY -04; TUTORIALS- 02

Semester: - 2nd
Paper Code: - CAPC1222M
Batch: - 2023

Course Objective:

- Cultivate clear thinking and creative problem solving
- To introduce elementary discrete mathematics for computer science.
- To Familiarize with formal logic notation, methods of proof, induction, sets and relations.

Course Outcomes:

- Ability to reason logically.
- Understand and construct precise mathematical proofs.
- Apply logic and set theory to formulate precise statements.
- Analyse and solve counting problems on finite and discrete structures.
- Describe and manipulate sequences.

UNIT – I

LOGIC AND PROOFS: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Introduction to Proof Techniques and Mathematical Induction.

SET THEORY: Sets, Set operations, Functions and Relations, Sequences & Summations.

UNIT – II

COUNTING: The Basics of Counting, Pigeonhole Principle & Permutations and Combinations.

NUMBER THEORY: Prime numbers and divisibility, The Fundamental Theorem of Arithmetic (without proof), Modular arithmetic and congruences, Greatest Common Divisor (GCD) and Euclidean Algorithm.

UNIT – III

Matrices and Vectors: Concepts, Transformation, Rank of matrix, Normal form, Consistency of linear system of equations. Linear dependence and independence of vectors, Eigen values and Eigen vectors, Properties of Eigen values, Reduction to diagonal form., linear and orthogonal transformations, Matrix polynomial.

UNIT – IV

GRAPH THEORY: Basic terminology and definitions in graph theory, Types of graphs, Graph representation, Graph Connectivity Basic Concepts, walk, path, cycle and circuit, connected graphs, and Euler's Formula, Multi-graphs and Euler Circuits.

TEXT & REFERENCES:

1. Discrete Mathematics and Its Applications - Kenneth H Rosen, 8th Edition, Tata McGraw-Hill.
2. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R.Manohar, Tata McGraw-Hill.
3. Elements of Discrete Mathematics, C. L. Liu, Tata McGraw-Hill.
4. A Textbook of Discrete Mathematics, Swapan Kumar Sarkar, S Chand Publishing.
5. <https://www.coursera.org/specializations/discrete-mathematics>
6. NPTEL Discrete Structures Course @ <https://nptel.ac.in/courses/106106094>
7. SWAYM Discrete Structures Course @ https://onlinecourses.nptel.ac.in/noc19_cs67/preview
8. <https://www.edx.org/learn/discrete-mathematics>

Course Type: - Minor

Paper Title: - PROGRAMMING WITH C

Credit Weightage: - THEORY -04; PRACTICALS- 02

Semester: - 2nd

Paper Code: - ACPC1222N

Batch: - 2023

Course Objective:

- To understand the fundamentals of Programming and various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To develop students' problem-solving abilities that require algorithmic thinking and logical reasoning.
- To learn the usage of structured programming approaches in solving problems.

Course Outcomes:

- To write algorithms and to draw flowcharts for solving problems.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- To create, read and write to and from simple text and binary files.

UNIT – I

INTRODUCTION TO PROGRAMMING: Computing Environment, Computer Languages Syntax and semantics, source and object code, creating compiling and running programs, Software Development Method, Algorithms, Pseudo code and flow charts.

INTRODUCTION TO C PROGRAMMING LANGUAGE: variables (with data types and storage requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, type conversion. Storage classes and bitwise operators.

CONDITIONAL BRANCHING AND LOOPS: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while AND do- while loops. Input/output (I/O): Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

UNIT – II

ARRAYS, STRINGS, STRUCTURES AND POINTERS: Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays. Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings. Structures: Defining structures, initializing structures, unions, Array of structures. Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of pointers. Enumeration data type.

UNIT – III

FUNCTION AND DYNAMIC MEMORY ALLOCATION: Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries. Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation.

UNIT – IV

PREPROCESSOR AND FILE HANDLING IN C: Pre-processor: Commonly used Pre-processor commands like include, define, undef, if, ifdef, ifndef. Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

TEXT & REFERENCES:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2. PROGRAMMING IN ANSI C, E. Balagurusamy, 8TH EDITION, McGraw-Hill.
3. Let Us C, YashavantKanetkar, 18th Edition, BPB.
4. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill.
5. How to solve it by Computer, R.G. Dromey, Pearson (16th Impression).

LAB WORK - PROGRAMMING WITH C (ACPC1222N)

LIST OF PROGRAMMES TO BE EXECUTED:

1. Write a program for the computation of simple and compound interest.
2. Write a program for finding the max and min from the three numbers.
3. Write a program that declares Grade awarded to a student for a given percentage of marks.
4. Write a program that prints a multiplication table for a given number.
5. Write a program that shows the binary equivalent of a given positive number.
6. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Write a program to find the time taken by the ball to reach each floor.
7. Write a program, which takes two integer operands and one operator from the user, performs the operation and then print the result.
8. Write a program that finds if a given number is a prime number.
9. Write a program to find the sum of individual digits of a positive integer.
10. Write a program to generate all the prime numbers between 1 and n.
11. Write a program to find the roots of a Quadratic equation.
12. Write a program to generate the first 'n' terms of the Fibonacci sequence.
13. Write a program to find the minimum, maximum and average in an array of integers.
14. Write a function to compute mean, variance, Standard Deviations in an array of integers.
15. Write C programs that use both recursive and non-recursive functions to find the factorial, HCF and power of two given integers.
16. Write a program to compute the sum of n elements from an array using a pointer.
17. Write a function to convert a Roman numeral ranging from I to L to its decimal equivalent.
18. Write a function that converts a number ranging from 1 to 50 to its Roman equivalent.
19. Write a C program to determine if the given string is a palindrome or not.
20. Write a function that determines the position of a specified character within a given string. If the character is found, the function should return its position; otherwise, it should return -1.
21. Write a function to count the lines, words and characters in a given text.
22. Write a C program to display the contents of a file to standard output device.
23. Write a C program to merge two files into a third file.
24. Write a menu driven program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
25. In Write a C program to construct a pyramid of numbers as follows:

1	*	1	1	*
1 2	**	2 3	2 2	**
1 2 3	***	4 5 6	3 3 3	***
1 3 3 4	****	7 8 9 10	4 4 4 4	***