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|-----------------------------|---|-------------------------------------|
| Name of Faculty | : | Faculty of Engineering & Technology |
| Name of Program | : | Bachelor of Technology (B. Tech) |
| Course Code | : | 2BCO01 |
| Course Title | : | Computer Programming |
| Type of Course | : | Basic Engineering (BE) |
| Year of Introduction | : | 2023-24 |

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|-------------------------|-----|--|
| Prerequisite | : | Maths, logic and most importantly zeal to learn |
| Course Objective | : | To understand the fundamentals of computer programming. |
| Course Outcomes | : | At the end of this course, students will be able to: |
| | CO1 | Demonstrate problem solving skills by developing algorithms and drawing flowcharts to solve simple problems, Understand the process of compiling and executing a C program and recognize various C tokens and datatypes. |
| | CO2 | Understanding various programming constructs and applying it for the problems given in hand. |
| | CO3 | Demonstrate the use of various data structures like array, file and structure. |
| | CO4 | Applying the concepts of top-down modular programming to decompose problem and a program solution into smaller pieces and Analyse how length of the source program can be reduced by using functions. |
| | CO5 | Evaluate how pointers are effective in handling arrays, functions and data tables and how pointers support Dynamic memory management. |
| | CO6 | Develop C Programs using various methods described above to solve real-world problems. |

Teaching and Examination Scheme

| Teaching Scheme (Contact Hours) | | | Credits | Examination Marks | | | | |
|---------------------------------|---|---|---------|-------------------|-----|-----|-----|-------------|
| L | T | P | | SEE | CIA | SEE | CIA | Total Marks |
| 2 | 0 | 2 | 3 | 70 | 30 | 30 | 20 | |

Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P – Practical, C – Credit, SEE – Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

| Unit No. | Topics | Teaching Hours | Weightage | Mapping with CO |
|----------|---|----------------|-----------|-----------------|
| 1 | Introduction to 'C' Language: Program, Software, Instruction, debugging, compilation and execution of C Program, Difference between Header files & library files, Compiler and Interpreter, Procedure Oriented Language, Importance of C, Basic structure of C, Algorithms & Flowchart. | 02 | 05% | CO1 |
| 2 | Constants, Variables & Data Types in 'C': Character set, C tokens, Keywords & Identifiers, Data types, Constants, Variables, Declaration of Variables, Assigning Values to Variables, Declaring a variable as Constant, Defining Symbolic constants. | 03 | 06% | CO1 CO2 |
| 3 | Operators and Expression in 'C': Classification of operators: Arithmetic, Relational, Logical, Assignment, Increment / Decrement, Conditional, Bitwise, Special Operators. Unary, Binary and Ternary Operators. Arithmetic expression, Evaluation, Type conversion: Implicit & Explicit, Precedence and Associativity, Various library functions from maths.h. | 03 | 06% | CO1 CO2 |
| 4 | Managing Input & Output Operations: Reading a Character, Writing a Character, Various library functions from ctype.h. Formatted Input, Formatted Output | 01 | 02% | CO1 CO2 |
| 5 | Conditional Statements, Branching and Looping: Decision making using simple if, if...else statement, nesting of if...else, else...if Ladder. Switch statements, conditional operator, goto statement. Need of looping, (pre-test) entry-controlled loop: while, for, (post-test) exit-controlled loop: do...while, difference between Counter- Controlled loops and Sentinel - controlled loops. Nesting of looping statements, use of break & continue, use of if...else in loop, infinite loop. | 06 | 14% | CO1 CO2 |
| 6 | Arrays: Character Arrays and Strings: Need of array, Declaration & Initialization of 1D array, Programs of 1D. 2D array, Memory allocation of 1D and 2D array, 2D array basic programs. Difference of character array with numeric array and importance of NULL character. Declaration, Initialization and | 09 | 18% | CO3 |

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|----|---|----|-----|------------|
| | various input and output methods of string, formatted output of string, arithmetic operations on characters. Various functions of string.h: strlen, strcat, strcmp, strcpy, strcmp, strstr, etc. Two dimensional character array (table of strings). | | | |
| 7 | User-Defined Function in 'C': Need of modularization, advantages, Introduction to user-defined function, Function Prototype, Function Call, Function Body. Call by value, Actual & Formal Arguments, return value, Categories of functions, Nesting of Functions, Recursion. Array as Function arguments, Storage Classes: Scope, Life of a variable in 'C' | 05 | 14% | CO4 CO5 |
| 8 | Structures and Unions: Need of user-defined data type, Structure definition, Declaration and Initialization of variables, Array as member, Array of structure variables. Structure within structure, Structure as function arguments, Union. | 03 | 08% | CO4 CO5 |
| 9 | Pointers & Dynamic Memory Allocation : Introduction to pointer, declaration & initialization, access value using pointer, indirection (*) operator. Pointers in expressions, scale factor, 1D-array and pointer, pointer with strings, Array of pointers. Pointer as arguments in function, Call by address, Functions returning pointers, Pointers and structures, Chain of Pointers. Introduction, memory allocation process. Use of functions: malloc (), calloc (), realloc () and free (). | 08 | 19% | CO5 |
| 10 | File Management in 'C': Introduction, Defining and Opening a file, closing a file, modes of file, read & write single character and integer to file, use of fprintf and fscanf functions. Error handling functions, random access of files using ftell, rewind, fseek, command line argument. | 05 | 08% | CO6 |

| Suggested Distribution of Theory Marks Using Bloom's Taxonomy | | | | | | |
|---|-------------|---------------|-------------|---------|----------|--------|
| Level | Remembrance | Understanding | Application | Analyse | Evaluate | Create |
| Weightage | 20 | 30 | 30 | 20 | 0 | 0 |

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

| Sr. No. | Name of Experiment/Tutorial | Teaching Hours |
|---------|---|----------------|
| 1 | Experiment to manage input and output operations | 02 |
| 2 | Experiment to demonstrate operators and expressions | 02 |
| 3 | Experiment to demonstrate conditional statements and branching | 02 |
| 4 | Experiment to apply loops | 06 |
| 5 | Experiment to demonstrate working of arrays | 04 |
| 6 | Experiment to demonstrate working of strings | 04 |
| 7 | Experiment to implement user defined functions in C | 04 |
| 8 | Experiment to implement structures and unions | 02 |
| 9 | Experiment to implement Dynamic memory allocation | 02 |
| 10 | Experiment to implement file handling using file management functions | 02 |

Major Equipment/ Instruments and Software Required

| Sr. No. | Name of Major Equipment/ Instruments and Software |
|---------|---|
| 1 | Code::Blocks |
| 2 | TurboC++ Version 3.0 |

Suggested Learning Websites

| Sr. No. | Name of Website |
|---------|---|
| 1 | www.tutorials4u.com/c/ |
| 2 | www.cprogramming.com/tutorial.html |
| 3 | www.howstuffworks.com/c.htm |
| 4 | http://www.programmingtutorials.com/c.aspx |
| 5 | http://www.physics.drexel.edu/courses/Comp_Phys/General/C_basics/ |

Reference Books

| Sr. No. | Name of Reference Books |
|---------|---|
| 1 | Head First C by David Griffiths & Dawn Griffiths. |
| 2 | C How to program, 7/E by Deitel&Deitel, Prentice Hall |
| 3 | C: The Complete Reference by Herbert Schildt |
| 4 | Practical C Programming (Third Edition) by Steve Oualline |