

PROGRAMMING FOR PROBLEM SOLVING USING C LAB
(Common to all branches)

Course Code: 20CT1102

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Course Outcomes: At the end of the Course the student shall be able to

CO1: apply the concepts of variables, data types, operators and expressions.(L3)

CO2: demonstrate the usage of Conditional and Unconditional statements. (L3)

CO3: demonstrate the usage of functions and relate functions with respect to arrays and strings. (L3)

CO4: implement the concept of pointers and structures. (L3)

CO5: demonstrate the usage of files and Command Line Arguments. (L3)

List of Programs: (Any **Twelve** programs should be carried out)

1. Basic Programs

- A. C program to display hello world message.
- B. C program to scan all data type variables as input and print it as output.
- C. C program to perform arithmetic operations like +,-,*,/,% on two input variables.
- D. C program to perform temperature conversions from Centigrade to Fahrenheit and vice versa.

2. Programs on Operators

- A. C program to scan an input and perform pre and post increment operation on it and display the result.
- B. C program to perform all bit wise operations.
- C. C program to extract the last two digits of a given integer n, where the number of digits should be greater than 2.
- D. C program to display the greatest of three numbers using a conditional operator.
- E. C program to swap two numbers without using a third variable.

3. Programs on Conditional Statements

- A. C program to check whether a given input integer is in between two values x and y.
- B. C program to check whether a given character is a vowel or a consonant or a digit or a special symbol.
- C. C program to display the nature of roots of a quadratic equation.
- D. C program to perform arithmetic operations using switch statement.
- E. C program to convert upper case character to lowercase and vice versa.

4. Programs on Loop Statements

- A. C program to print odd numbers between specified ranges.
- B. C program to display the factors of a given number and check whether it is a prime or not.
- C. C program to display the sum of individual digits of a given integer raised to the power of n. Also check whether the given integer is Armstrong or not.
- D. C Program to demonstrate the usage of unconditional control statements.
- E. C program to display the following pattern.

```

5 4 3 2 1
4 3 2 1
3 2 1
2 1
1

```

5. Programs on Functions

- A. C program to demonstrate the various categories of functions with respect to return type and number of arguments.
- B. C program to find the LCM of two numbers using functions.
- C. Create a header file which contains the following prototype:
 - i. `int factorial(int) ; // non-recursive function`
 - ii. `int factorial_rec(int); //Recursive function`
 - iii. `int prime(int);`

Use the above functions in a C program by including the above header file. D.

C program to display Pascal's triangle using functions.

6. Programs on Arrays

- A. C program to read n integer values into an array and display them
- B. C program to count and display the number of positive, negative, even and odd numbers in a given array of integers and also display their sum.
- C. C program to find the smallest and largest numbers in an array of integers.
- D. C program to perform addition, multiplication, transpose of given matrices using functions.
- E. C program to check whether a given integer exists in a list of numbers and print its index value if it is present, otherwise print "No".

7. Programs on Strings

- A. C program to convert upper case character to lowercase and vice versa in a given string.
- B. C program to delete all vowels in a given string and display the remaining string.
- C. C program to check whether a given string is palindrome or not.
- D. C program that reads two integers as strings and displays their sum.

8. Programs on Strings

- A. C program to demonstrate the usage of at least 10 predefined string handling functions.
- B. C program that implements the following user defined string handling functions
 - i. To find the length of the given string
 - ii. To copy the contents of one string to another
 - iii. To reverse the contents of a string
 - iv. To compare two strings
 - v. To concatenate two strings

9. Programs on Pointers and Dynamic Memory Allocation

- A. C program to demonstrate the usage of pointers.
- B. C program that uses dynamic memory allocation functions to add n elements and display their average.
- C. C program that performs pointer arithmetic.
- D. C program that implements call by reference.

10. Programs on Pointers

- A. C program to demonstrate the following
 - i. Pointers to Pointers
 - ii. Array of Pointers
 - iii. Pointer to Array
 - iv. Pointers to Functions

11. Programs on Structures

- A. C program to access and display the members of the structure.
- B. C program that demonstrates different ways to access the structure elements using pointers.

12. Programs on Files

- A. C program to read the contents of a file and display on the output screen.
 - B. C program to copy the contents of one file to another.
 - C. C program to count and display the number of characters, words and lines in a file.
 - D. C program to print last n characters of a file by reading file name and n value from command line.
13. C program to replace all the vowels in a given string with a given character
14. C program to perform arithmetic operations using command line arguments
15. C program that writes the contents to a file and reads the contents from a file using structures.

Reference Books:

1. Ashok N Kamthane, Amit Ashok Kamthane, *Programming in C*, 3rd Edition, Pearson Publication 2015.
2. Herbert Schildt, *The Complete Reference C*, 4th Edition, Tata McGraw-Hill, 2017.
3. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, 2nd Edition, Prentice-Hall, 2015.
4. Rajaraman V, *The Fundamentals of Computer*, 6th Edition, Prentice-Hall of India, 2014.
5. Steve Oualline, *Practical C Programming*, 3rd Edition, O'Reilly Press, 2006.
6. Balagurusamy E, *Programming in ANSI C*, 8th Edition, Tata McGraw-Hill, 2019.
7. Gottfried, *Programming with C*, 3rd Edition, Tata McGraw-Hill, 2018.

Web References:

1. https://onlinecourses.nptel.ac.in/noc19_cs42/preview
2. <https://www.programiz.com/c-programming>