C PROGRAMMING LABORATORY

Common to ECE, CSE, IT, CSE(AI&ML) & CSE(DS) Branches

21CS106ES/21CS206ES **L T P C**
0 0 3 1.5

Pre-requisites: Nil

Course Objectives: The students will learn the following:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
5. To Write programs using the structure and Union concept.
6. To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to

CO 1: Formulate and translate the algorithms for simple problems

CO 2: Identify and correct syntax and logical errors
CO 3: Represent and manipulate data with arrays, strings and structures
CO 4: Use Functions and pointers of different types
CO 5**:** Create, read and write to and from simple text and binary files

LIST OF EXPERIMENTS	
Ex. No. 1	**C Programming using Simple statements and expressions**
1. Write a C program to check whether a number is even or odd using ternary operator. 2. Write a C program to perform the addition of two numbers without using + operator. 3. Write a C program to evaluate the arithmetic expression ((a + b / c * d - e) * (f - g)). Read the values a, b, c, d, e,f, g from the standard input device. 4. Write a C program to find the sum of individual digits of a 3-digitnumber. 5. Write a C program to read the values of x and y and print the results of the following expressions in one line: i. (x+ y) /(x-y) ii. (x+ y) (x-y)	
Ex. No. 2	**Problem-solving using decision making.**

1. Write a C program to find the sum of individual digits of a positive integer.
2. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n termsof the sequence.
3. Write a C program to generate all the prime numbers between1andn, where n is a value supplied by the user.
4. Write a C program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol using if-else and switch case. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A– Z	65–90
a– z	97 –122
0 –9	48–57
Special symbols	0–47,58 – 64,91 – 96,123– 127

5. If cost price and selling price of an item is input through the keyboard, write a program to determine whether theseller has made profit or incurred loss. Write a C program to determine how much profit or loss in curred in percentage.

Ex. No. 3	Scientific problem-solving using looping.

1. Write a C program, which takes two integer operands and one operator from the user, performs the operation andthen prints the result. (Consider the operators+,-, *, /, % and use switch statement).
2. Write a C program to calculate the followingsum: sum= $1– x^2 /2!+x^4/4!– x^6 /6!+x^8 /8!$
3. Write a C program to find the roots of a quadratic equation.
4. Write a C program to check whether a given 3-digitnumber is Armstrong number or not.
5. Write a C program to print the numbers in triangular form

```
1
12
123
12 34
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Ex. No. 4	Simple programming for one dimensional and two-dimensional arrays.

1. Write a C program to find the second largest integer in a list of integers.
2. Write a C program to perform the following:
   i. Addition of two matrices
   ii. Multiplication of two matrices
3. Write a C program to count and display positive, negative, odd and even numbers in an array.
4. Write a C program to merge two sorted arrays into another array in a sorted order.
5. Write a C program to find the frequency of a particular number in a list of integers.

Ex. No. 5	Solving problems using String functions

1. Write a C program that uses functions to perform the following operations:
   i. To insert a sub string into a given main string from a given position.
   ii. To delete n characters from a given position in a given string.
2. Write a C program to determine if the given string is a palindrome or not.
3. Write a C program to find a string within a sentence and replace it with another string.
4. Write a C program that reads a line of text and counts all occurrence of a particular word.
5. Write a C program that displays the position or index in the string S where the string T begins, or 1 if S doesn'tcontain T.

Ex. No. 6	Programs with user defined functions – Includes Parameter Passing

1. Write C programs that use both recursive and non-recursive functions
   i. To find the factorial of a given integer.
   ii. To find the greatest common divisor of two given integers.
2. Write C programs that use both recursive and non-recursive functions
   i. To print Fibonacci series.
   ii. To solve towers of Hanoi problem.
3. Write a C program to print the transpose of a given matrix using function.
4. Write a C program that uses a function to reverse a given string.

Ex. No. 7	Programs using Pointers

1. Write a C program to concatenate two strings using pointers.
2. Write a C program to find the length of string using pointers.
3. Write a C program to compare two strings using pointers.
4. Write a C program to copy a string from source to destination using pointers.
5. Write a C program to reverse a string using pointers.

Ex. No. 8	Program using Structures and Union

1. Write a C program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition and subtraction of two complex numbers
   iv. Multiplication of two complex numbers. Note: represent complex number using a structure.
2. Write a C program to compute the monthly pay of 100 employees using each employee's name, basic pay. The DA iscomputed as 52% of the basic pay. Gross-salary (basic pay + DA). Print the employees name and gross salary.
3. Create a Book structure containing book_ id, title, author name and price.Write a C program to pass a structure as afunction argument and print the book details.
4. Create a union containing 6 strings: name, home_ address, hostel_ address, city, state and zip. Write a C program todisplay you present address.
5. Write a C program to define a structure named DOB, which contains name, day, month and year. Using the conceptof nested structures display your name and date of birth.

Ex. No. 9	**Program using Preprocessor Directives**

1. Define a macro with one parameter to compute the volume of a sphere. Write a C program using this macro tocompute the volume for spheres of radius 5, 10 and 15 meters.
2. Define a macro that receives an array and the number of elements in the array as arguments.Write a C program forusing this macro to print the elements of the array.
3. Write symbolic constants for the binary arithmetic operators +,-,*, and/. Write a C program to illustrate the use ofthese symbolic constants.

Ex. No. 10	**Program using Files**

1. Write a C program to display the contents of a file.
2. Write a C program to copy the contents of one file to another.
3. Write a C program to reverse the first n characters in a file, where n is given by the user.
4. Two files DATA 1 and DATA 2 contain sorted lists of integers. Write a C program to merge the contents of two filesin to a third file DATA i.e., the contents of the first file followed by those of the second are put in the third file.
5. Write a C program to count the no. of characters present in the file.

Ex. No. 11	**Program using Command line Arguments**

1. Write a C program to read arguments at the command line and display it.
2. Write a C program to read two numbers at the command line and perform arithmetic operations on it.
3. Write a C program to read a file name at the command line and display its contents.

Ex. No. 12	**ADDITIONAL PROGRAMS**

1. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots+x^n$. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.Printx, n, the
   sum. Perform error checking. For example, the formula does not make sense for negative exponents–if n is less than
   0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of withoutcomputing the sum. Are any values of x also illegal? If so, test for them too.
2. Write a C program to find the 2's complement of a binary number.
3. Write a C program to convert a Roman numeral to its decimal equivalent. E.g .Roman number CD is equivalent to 400.

REFERENCES:

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4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
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6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition