ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - I Sem

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(CS109ES) PROGRAMMING FOR PROBLEM SOLVING LABORATORY

Course Objectives:

The objectives of this course are to provide:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyse the various steps in program development and to create, read from and write to text and binary files.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept and create, read from and write to text and binary files

Practice sessions:

1. Write a simple program that prints the results of all the operators available in C (including pre/post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple numeric problems:

a) Write a program for finding the max and min from the three numbers.

b) Write the program for the simple, compound interest.

c) Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

d) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

5 x 1 = 5

5 x 2 = 10

5 x 3 = 15

e) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a) A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-

c) ,*, /, % and use Switch Statement)

d) Write a program that finds if a given number is a prime number

e) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

f) 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 terms of the sequence.

g) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

h) Write a C program to find the roots of a Quadratic equation.

i) Write a C program to calculate the following, where x is a fractional value. 1-x/2 +x^2/4-x^3/6

j) 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+ +x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:

a) Write a C program to find the minimum, maximum and average in an array of integers.

b) Write a function to compute mean, variance, Standard Deviation, sorting of n elements in asingle dimension array.

c) Write a C program that uses functions to perform the following:
i.Addition of Two Matrices ii.Multiplication of Two Matrices
iii.Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.

d) Write C programs that use both recursive and non-recursive functions
i.To find the factorial of a given integer.
ii.To find the GCD (greatest common divisor) of two given integers.
iii.To find x^n

e) Write a program for reading elements using a pointer into an array and display the values using the array.

f) Write a program for display values reverse order from an array using a pointer.

g) Write a program through a pointer variable to sum of n elements from an array.

Files:

a) Write a C program to display the contents of a file to standard output device.

b) Write a C program which copies one file to another, replacing all lowercase characters with

their uppercase equivalents.

c) Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

d) Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)

Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)

e) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

a) Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

b) Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

c) 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.

d) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

e) Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.

f) Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a) Write a menu driven C 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 invalidchoice is entered.

b) 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      * *
                                             *
                                4 4 4 4      * *
                                             *
```

Sorting and Searching:

a) Write a C program that uses non recursive function to search for a Key value in a givenlist of integers using linear search method.

b) Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
c) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
d) Write a C program that sorts the given array of integers using selection sort in descending order
e) Write a C program that sorts the given array of integers using insertion sort in ascending order
f) Write a C program that sorts a given array of names

Text Books:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

1. Apply fundamental programming concepts and Exercise control statements to solve simple problems.
2. Represent and manipulate data with arrays and strings
3. Modularize the code with functions so that they can be reused.
4. Develop applications using user defined data types
5. Implement various searching and sorting techniques

CO-PO-PSO Mapping:

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**
CO-1	H	M	L	L									H	L
CO-2	L	M	L	H									H	L
CO-3	M	H	H	M									H	M
CO-4	L	M	M	M									H	L
CO-5	L	H	H	H									H	M

H-HIGH **M**-MODERATE **L**-LOW