

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

(CS108ES) PROGRAMMING FOR PROBLEMSOLVING LABORATORY

I Year B. Tech. IT - I Sem

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Course Objectives:

The objective of this course is to provide:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- 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.

Practice sessions:

- a) 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.
- b) 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%=Secondclass, 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:

$$5 \times 1 = 5$$

$$5 \times 2 = 10$$

$$5 \times 3 = 15$$

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

LIST OF EXPERIMENTS:

- 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 $s = ut + \frac{1}{2}at^2$ 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 +, -, *, /, % and use Switch Statement)
- c. Write a program that finds if a given number is a prime number
- d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- e. 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.
- f. Write a C program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
 - g. Write a C program to find the roots of a Quadratic equation.
- h. Write a C program to calculate the following, where x is a fractional value. $1 - x/2 + x^2/4 - x^3/6$
 - i. Write a C program to read in two numbers, x and n , and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$. 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 a single 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.

- b. 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
- c. Write a program for reading elements using a pointer into an array and display the values using the array.
- d. Write a program for display values reverse order from an array using a pointer.
- e. 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 out put device.
- b. Write a C program which copies one file to another, replacing all lower case 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 a to i 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 number arranging 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 invalid choice is entered.

- b. Write a C program to construct a pyramid of numbers as follows:

1	*	1	1	*
12	**	23	22	**
123	***	456	333	**
				*
			4444	**
				*

Sorting and Searching:

- a. Write a C program that uses non recursive function to search for a Key value in a given list 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

Course Outcomes:

- 1. Upon the successful completion of this course, the student will be able to:
- 2. Apply fundamental programming concepts and Exercise control statements to solve simple problems.
- 3. Represent and manipulate data with arrays and strings
- 4. Modularize the code with functions so that they can be reused.
- 5. Develop applications using user defined data types

Text Books:

- 1. Jeri R. Hanly and Elliot B. Koff man, Problem solving and Program Design in C 7th Edition, Pearson

- B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

Reference Books:

- Brian W.Kernighan and Dennis M.Ritchie,The C Programming Language, PHI
- E.Balagurusamy,ComputerfundamentalsandC,2ndEdition,McGraw-Hill
- YashavantKanetkar,LetUsC,18thEdition,BPB
- R.G.Dromey, Howto solveit by Computer, Pearson(16thImpression)
- Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
- HerbertSchildt,C:TheCompleteReference,McGrawHill,4thEdition
- Byron Gottfried ,Schaum’s Outline of Programming with C,McGraw-Hill

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