

**1/4 B.Tech. SECOND SEMESTER  
ADVANCED C PROGRAMMING LAB**

**CS2L3**

**Required**

**Credits: 4**

**Lecture: --**

**Internal assessment: 25 marks**

**Lab: 6 periods/week**

**Semester end examination: 50 marks**

**Course context and Overview:** Advanced C programming including the preprocessor, advanced pointers, data structures, algorithms, and program structure.

**Prerequisites: Basic C Programming**

**Objective:**

1. To develop programming skills using the fundamentals and basics of C language.
2. To impart the knowledge about pointers which is the backbone of effective memory handling
3. To study the advantages of user defined data type which provides flexibility for application development
4. To teach the basics of preprocessors available with C compiler.

**Learning Outcomes:**

An ability to:

- 1). Analyze and apply the debugging techniques in 'C' programs.
- 2). Develop 'C' programs in structured programming orientation.
- 3). Develop the user defined data types for simplifying the data manipulation.
- 4). Apply the file manipulation concepts to organize data.
- 5). Implement the 'C' programs by a team of people for engineering applications.

**BASIC I/O & DATA TYPES**

1. Write a program to find the larger number among a list of numbers.
2. Write a program for calculating the simple interest using the formula  $SI=(P * T *R) /100$ , where P denotes the principal amount, and R rate of interest.
3. Write a C program that would find the length of a straight line formed by two end points, whose coordinates would be given as inputs.
4. The packing department of a television set manufacturer has to prepare a requisition note listing the number of different boxes required for the different TV models that it has received from the production department. The list prepared has to be forwarded to the stores department so that the required boxes are issued to the packing department. The category and the number of boxes required for each type of TV model is given as follows.

Model Type	Box Type	Numbers
TV –LCD 17	1	98
TV-LCD 22	2	79
TV-LCD 26	3	65
TV-LCD 32	4	43

**Analysis:**

The Problem provides some data based on which a requisition note has to be prepared and printed. The note should specify the type and number of box required for each kind of TV model.

The program, written for accomplishing the task specified by the problem , accepts the number of sets of different TV models for each of which a particular type of packing box is required . The box type for each model is of standard dimensions and is pre-assigned a unique type number. Using the data provided by the problem, a requisition note is printed by program as shown below.

Enter number of TV-LCD 17 model to packed : 98

Enter number of TV-LCD 22 model to packed : 79

\*\*\*\*\* Requisition Note \*\*\*\*\*

```

-----
-----
TV Model          | Box Type |          Numbers
                  | required |
-----
-----
TV - LCD 17      1          98
TV - LCD 22      2          79

```

**CONTROL STATEMENTS**

5. Write a program to read some numbers (continuously) and then find their average. Euler’s number e is used as the base of natural logarithms. It may be approximated using the formula:

$$E = 1/0! + 1/1! + 1/2! + ..... + 1/(n-1)! + 1/n!$$

6. Where n is sufficiently large. Write a program that approximates e using a loop that terminates when the difference between the two successive values of e is less than 0.0000001.

7. Write a program to print Floyd’s Triangle. Floyd's triangle is a right angled-triangle using the natural numbers. Examples of Floyd’s triangle:

Example 1:

```

  1
 2 3
4 5 6
7 8 9 10

```

8. Write a program that prompts the user to enter data as three integer values for the month, the day and the year. The program should then output the date in the form 31<sup>st</sup>

December 2003 when user enters 12 31 2010,say. The program has to work out the

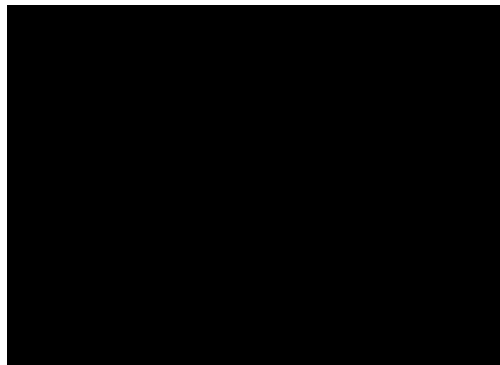
---

superscripts “th”,”st”,”nd” and “rd” need to appended to the day value. The programmer should not forget 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and then 11<sup>th</sup>, 12<sup>th</sup>, ... and 21<sup>st</sup>, 22<sup>nd</sup>

9. Get the lengths of three sides of triangle. Check whether the triangle can be formed or not. If possible then classify the triangle as equilateral, isosceles or scalene. Otherwise, if triangle cannot be formed give the user a chance to re-enter the lengths of the sides or terminate the program.
10. Write a program to check whether a number is Krishnamurthy number or not. A Krishnamurthy number is one whose sum of factorial of digits equals the number.
11. Write a program to print pascal Traingle.

Analysis :

**Pascal's triangle** is [a triangular array of the binomial coefficients](#). It is named after the French mathematician [Blaise Pascal](#).



12. Write a program to compute the square root of a given number, without using sqrt() function of the math library.

## ARRAYS & STRINGS

13. Write a program to find the given number in an array using binary search.
14. Write a program to delete the given word in a sentence.  
Example : Enter the sentence : Ram is a good boy  
Enter the word to be deleted : good  
After deletion the sentence is as follows ..... Ram is a boy.
15. Using arrays to represents the three vertices of a triangle, calculate the length of the three sides of triangle formed with these vertices. Then determine whether triangle can be formed with given vertices.
16. A company manufactures three types of UPS models. At the end of any month serial

numbers are to be generated for each of the models manufactured. The last serial number of each type of model has to be taken into consideration for generating the new set of serial number for each set of models. At the end of particular month the following data is available for generating the new serial numbers model-wise:

Model Type	Units manufactured	Last serial number
Ups1	3	24
Ups2	4	19
Ups3	5	9

A program has to be written that generates the new serial numbers for each model type for the month under consideration taking the above as input.

### FUNCTIONS

17. Write a program that uses a function to perform addition and subtraction of two matrices having integer numbers.
18. The functional value at a point has to be determined with only a few given functional values at some points and without any functional expressions being given. Using Lagrange's interpolation technique, find the functional value at a given point.
19. Write a function that will print the longest word written in a line.
20. Write a function that looks for one string with another, returning a pointer to the string it can, or a null pointer.

Ex : Enter a string : Ram is a good boy ( Case insensitive search) Enter another string: good

Output : good is present in the string at position \_\_

### POINTERS & DYNAMIC MEMORY ALLOCATION

21. Write a program to specify the number of rows and columns for a two-dimensional array. And allocate memory dynamically.(Data is read into the array, and then the array is printed)
22. The CEO signs vouchers, cheques, and documents where the amount is given in digits as well as in words. Every time before signing these, the CEO checks up whether the amount written in words matches with that of the digits. To do this swiftly the CEO needs a program in the counter that would accept the value written on vouchers, cheques, and documents and display the amount in words. The amount in any case should not exceed Rs.99 crores. A program has to written to perform this task.
23. Check whether a triangle can be formed by determining the length of each side from the three given vertices and using the condition that in a triangle, the sum of any two sides is greater than the third side. Calculate the area of triangle if it can be formed with the given vertices. Next verify whether a given point is within or outside the triangle.
24. A program has to be written that takes in student data and display the same in the order of entry. It should provide the user the option to choose to the display of a particular student given the name or the roll number. Provision for displaying all the student records in ascending order of name or ascending order of grade should also be provided as options.

### FILES

25. Write a C program that takes the name of a file as a command line argument , opens

the file, reads through it to determine the number of words in each sentence, displays the total number of words and sentences, and computes the average number of words per sentence. The results should be printed in a table such as below:  
This program counts the words and sentences in file “ comp.txt”.

Sentence : 1        Words : 29

Sentence : 2        Words :41

---

Sentence : 3        Words : 16

File “comp.txt” contain 86 words in 3 sentences for an average of 28.3 words per sentence.

26. A computer phone book containing name of persons, their home, office and mobile phone numbers has to be prepared. This book should have the necessary provision for adding, editing and deleting phone numbers and display the phone number of any person from the Phone book as and when required.

### **Learning Resources**

#### **Reference Books:**

Programming in C , Pradip Dey, Manas Ghosh, Second Edition , Oxford Education