Department of Computer Science and Engineering, NITK, Surathkal

Course Plan and Evaluation Scheme

(B. Tech 1st Semester, 2023-24)

1. Course code: CS111

2. Course Title: Computer Programming Lab

3. L-T-P: (0-0-3)

4. Credits: 2

5. Semester: 1st Semester B. Tech.

6. Academic Year: 2023-24

7. Teaching Department: Computer Science & Engineering

8. Objective of the Course:

- Learning to code and debug C programs in a UNIX environment.

- Implement programming strategies to understand various C language concepts.

9. Skill development expected from the course:

- Develop efficient and modular C code.

- Develop programming skills, logical thinking, and reasoning for problem solutions.

10. Course Coverage:

Module No.	Topic	No. of Labs	Remarks
M-1*	UNIX shell commands, execution, and debugging of programs	1	-
M-2	Basic input-output, operators, and expressions	2	Submission of the report (consisting of exercises' source code and snapshots of the results) in pdf format is compulsory.
M-3	Decision making, branching, and looping	2	
M-4	Arrays & Strings	2	
M-5	Functions and Recursions	2	
M-6	Structures and Union	2	
M-7	Pointers	2	
M-8	Files and file operations	1	

Note: * - No submission of the report

11.Course Contents

M-1. UNIX shell commands, execution, and debugging of programs

Introduction to basic commands of writing, compiling, and executing C programs

M-2. Basic Input-Output functions

1. To find Simple and Compound Interest

2. To read the radius of a circle and find its Area and Perimeter.

3. To read the temperature in Fahrenheit and convert it to degree centigrade. 4. Program to accept student roll no, marks in 3 subjects and calculate total, average of marks and print them with appropriate messages.

5. An Employee's Basic Pay (BP) is to be read through a keyboard. DA is 40% of BP, HRA is 20% of BP, calculate the Gross Pay (GP) GP is computed as BP+DA+HRA. 6. Program to find the distance between two points (x1, y1) and (x2, y2) in a Cartesian plane.

7. Program to swap two numbers using a temporary variable. Also print the original and exchanged values.

M-2. Operators and Expressions

(Program to illustrate the use of Arithmetic, Relational, Logical, Assignment, Conditional, Increment or Decrement, Bitwise, Special operators, their associativity and precedence.)

1. The distance between two cities (in km.) is input through the keyboard. Write a program to convert and print this distance in meters, feet, inches and centimeters.

2. The length & breadth of a rectangle and radius of a circle are input through the keyboard. Write a program to calculate the area & perimeter of the rectangle, and the area & circumference of the circle.

3. If a five-digit number is input through the keyboard, write a program to calculate the sum of its digits.

4. If a five-digit number is input through the keyboard, write a program to reverse the number.

5. If the total selling price of 15 items and the total profit earned on them is input through the keyboard, write a program to find the cost price of one item.

6. Write a program to compute the values of square-roots and squares of the numbers 0 to 100

in steps 10.

M-3. Decision making- and Branching constructs

1. To determine whether a character entered is in lowercase, uppercase, digit or a special character.

2. Find the roots of quadratic equation

3. Given 3 sides, write a program to check whether the triangle can be formed for the following conditions.

No triangle if a>= b+c
Right Angled triangle if $a^2=b^2+c^2$
Obtuse triangle if $a^2>b^2+c^2$
Acute triangle if $a^2<b^2+c^2$
Equilateral triangle if all sides of the triangle are same
Isosceles triangle if two sides of the triangle are same
Scalene triangle otherwise

Implement using switch-case, if and else-if ladder:

4. Write a menu driven program to demonstrate the simple arithmetic calculator 5. Program to display the grade obtained by a student based on the marks. e relation between the grades and marks –

Marks Grades

Below 40 Fail
40-59 E
50-59 D
60-69 C
70-79 B
80-89 A
90-100 A+

M-3. Decision making and looping constructs

1. Program to reverse the digits of a number and to find the sum of the digits.

2. Program to find factors of a given number.

3. Program to find the prime and non-prime numbers between a given range.

4. Program to print numeric pyramid (Defined by the instructor).

5. Program to find GCD and LCM of two given numbers.

6. Program to evaluate $1+x^2/2! + x^3/3! +\ldots.+x^n/n!$

M-4. Arrays

1. To read an array of N elements and reverse it.

2. Program to count the number of palindromes in a given list of n numbers
3. Find the pair of numbers in an unsorted array such that their sum is the largest

4. Program to insert an element in a specified position in a given array. 5. To search for a key in an array using i)Linear search ii)Binary search 6. To sort array elements in ascending order using i) Bubble sort ii) Selection sort. 7. To add and multiply two matrices.

8. To interchange principal and secondary diagonal elements in a matrix.

M-4. Strings

1. To read a string and find its length without using a library function. 2. To reverse a string and check whether the string is palindrome or not. 3. To delete extra blank spaces in a string

4. Program to replace lowercase characters by uppercase & vice-versa 5. Program to delete all occurrences of a substring in a given line of text. 6. C Program to find all consecutive occurrences of any vowel in a string

M-5. Functions

1. Write a function to generate n Fibonacci numbers.

2. Program to implement the following string functions (use switch-case to make the program menu driven)

   i. Find length of a string.

   ii. Copy a string to the other.

   iii. Compare two strings.

3. Program to evaluate the equation $y = x^1 + x^2 + x^3 + \ldots\ldots x^n$

4. To add numbers using a function.

5. Program to calculate the value of np_r.

6. Program to find whether an entered year is a leap year or not.

M-5. Recursion

1. To find factorial of a number

2. To generate Fibonacci series up to a given number.

3. To search for a number using binary search method

4. To find the sum of series 1+1/3!+1/5! + …… +1/N!

5. Program to reverse a string.
6. Program to find the biggest number in an array.

M-6. Structures and Union

1. Program to input and display book information (Title of the book, Author , ISBN, Price)

2. Program to accept 5 people's name, address and telephone number and to search for the information of a particular person.

    i. Based on name

    ii. Based on telephone number

3. Accept a name, register number, marks in 6 subjects of N students. Find the total and average of each student. Sort this array of structures

    i. Based on name.

    ii. Based on the register number.

    iii. Accept a register number and search for this student using binary search iv. Find the average marks for each student and sort them in ascending order of average marks.

    v. Display the details of a student given his register number

4. Store the item number, item name, unit price and quantity in stock of N items in a supermarket. Display the following list of items present in the stock.

    i. List of items with unit price greater than Rs 129.

    ii. List of items with quantity in stock less than 5.

5. Write a menu driven program for the following

    i. Add two distances (in inch-feet) using structures

    ii. Add two complex numbers by passing structure to a function

    iii. Calculate the difference between two time periods using structures.

6. Write a C program to compare structure and union variables

M-7. Pointers

1. Program to count frequency of every character present in a line of text.

2. Program to swap two numbers.

3. Program to find area and circumference of a circle.

4. Write functions for the following string operations.
   a) Concatenation. b) Comparison. c) Length d) Copy e) Reverse.

5. Write a program to display the greatest of N numbers –use malloc() function. 6. Write a program to arrange N names in alphabetical order using dynamic memory allocation.

M-8. Files and file operations

1. Program to read data from the keyboard; write it in a file called DATA.txt. Again read the same data from the file and display it on the screen.

2. A file named DATA.txt contains a series of integer numbers. Write a program to read these numbers and then write all odd numbers to a file to be called ODD and all even numbers to a file to be called EVEN.

3. Copy the content of one file into another.

4. Program to append the content of a file at the end of another without using append mode.

5. Program to find the size of file using file handling function.

6. Program to find the number of lines in a text file.

12. Evaluation Plan:

Sl.No.	Items	Weightage (%)	Remarks
1	End-Sem+Viva	**30+5**	Common to all sections
2	Mid-Sem+Viva	**20+5**	Common to all sections
3	Regular Lab Performance	**20**	Left to the individual Instructor
4	Class Test	**20**	Common to all sections

Note:

- Grade cutoff is common for S7-S10,S13-S14 sections.

- A common end-sem, mid-sem and class test-1 & -2 will be conducted **through IRIS** for S7-S10,S13-S14 section as per the following tentative schedule.

Course Instructors   **Head of the Department**