

Birla Vishvakarma Mahavidyalaya

(An Autonomous Institution)

Computer Engineering Department

123ES: Programming For Problem Solving

(A.Y. 2024-25)

Lab Manual

Sr. No.	Name of the Experiment
1)	Practical Set - 1 <ol style="list-style-type: none">1. Introduction of C IDE and Programming Environment.2. To write, compile, and execute a simple C program that prints "Hello, World!" to the console, demonstrating basic input/output operations.3. To understand the use and importance of comments in C programming by writing a program that includes both single-line and multi-line comments, demonstrating their role in code documentation and readability.4. Write a program to declare variables of type's int, float, char, and double. Initialize them and print their values.5. Program illustrating use of arithmetic operators. The numbers X and Y are initialized in the program itself with $X = 25$ and $Y = 4$.6. Program illustrating use of declaration, assignment of value to variables. Also explains how to use symbolic constants. Program to calculate area and circumference of a circle.
2)	Practical Set – 2 <ol style="list-style-type: none">1. Write a program to perform type casting from float to int and vice versa. Observe the output and explain the difference.2. Write a program that read two nos. from keyboard and gives their addition, subtraction, multiplication, division and modulo.3. Write a program to convert Fahrenheit temperature to centigrade. The formula is $c = 5 * (fahr - 32) / 9$.4. Write a program to imagine a ticket counter at a movie theatre where tickets are issued to customers. The ticket number starts at 1 and increments by 1 for each customer. Similarly, if a customer returns a ticket, the ticket number decreases by 1.5. Write a program to find maximum and minimum of two numbers using ternary "?" operator.6. Write a program to multiply and divide the given number by 2 using bit-wise operators << and >>.
3)	Practical Set – 3 <ol style="list-style-type: none">1. Demonstrate Operator Precedence in Polynomial Evaluation (eq: $3x^3 + 2x^2 - 5x + 1$).2. Illustrate the effects of operator precedence and associativity in C by evaluating several expressions involving arithmetic, relational, and logical operators and displaying the results. It demonstrates: A. Default Precedence (Multiplication before Addition): The expression $x + y * z$

	<p>B. Parentheses for Control: The expression $(a + b) * c$</p> <p>C. Default Precedence (Modulo before Addition): The expression $d + e \% f$</p> <p>D. Associativity (Left-to-Right): The expression $g * h / i$</p> <p>E. Relational and Logical Operators: The expression $j == k \parallel l > k$</p> <p>3. Demonstrate the usage of sizeof with various built-in C data types: int, char, float, bool, double, long, and short.</p> <p>4. Write a C program demonstrating the use of library functions (math.h → sqrt(), pow(), ceil(), floor(), fabs()).</p> <p>5. Write a program to swap two number using third variable.</p> <p>6. Write a program to demonstrate getch(), putch() and getchar(), putchar().</p>																		
4)	<p>Practical Set – 4</p> <p>1. A parking lot system needs to check whether a car's license plate number is even or odd to determine which day it is allowed to enter (even-numbered cars enter on even days, odd-numbered cars on odd days).</p> <p>2. A university wants to implement an automated grading system based on a student's marks.</p> <p><u>Grading Criteria</u></p> <p>The university assigns grades based on the following marks range:</p> <table><tr><th>Marks Range</th><th>Grade</th><th>Description</th></tr><tr><td>90 - 100</td><td>A</td><td>Excellent Performance</td></tr><tr><td>80 - 89</td><td>B</td><td>Very Good Performance</td></tr><tr><td>70 - 79</td><td>C</td><td>Good Performance</td></tr><tr><td>60 - 69</td><td>D</td><td>Satisfactory Performance</td></tr><tr><td>Below 60</td><td>F (Fail)</td><td>Needs Improvement</td></tr></table> <p>3. An Automated Teller Machine (ATM) is a self-service banking device that allows users to perform financial transactions such as withdrawals, balance inquiries, and deposits. To ensure security and prevent unauthorized access, an ATM follows a two-step verification process:</p> <p>a. PIN Authentication – The ATM checks if the user has entered the correct Personal Identification Number (PIN). If the PIN is incorrect, access is denied.</p> <p>b. Balance Verification – If the PIN is valid, the ATM checks whether the user has enough balance to withdraw the requested amount. If the balance is insufficient, the transaction is declined.</p> <p>This logic is implemented using nested if-else statements in programming, where one condition (PIN validation) must be satisfied before checking another condition (sufficient balance).</p> <p>4. A restaurant has a menu where customers can choose an item by entering its corresponding number. The program displays the item name and price based on the user's selection.</p>	Marks Range	Grade	Description	90 - 100	A	Excellent Performance	80 - 89	B	Very Good Performance	70 - 79	C	Good Performance	60 - 69	D	Satisfactory Performance	Below 60	F (Fail)	Needs Improvement
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5)	<p>Practical Set – 5</p>																		

	<div><div><div>1. Write a program to accept a number from user and print factorial of it by using while loop.</div><div>2. Write a program to take input as a number and reverse it by using while loop.</div><div>3. Write a program accepts a number from user and check whether it is Armstrong or not by using while loop. e. g. 153 is Armstrong number. The summation of cubes of all the digits should be exactly equal to the number $153 = (1*1*1) + (5*5*5) + (3*3*3) = 1+125+27 = 153$</div><div>4. Write a program to accept an integer number and print whether it is palindrome or not by using while loop.</div></div></div>				
6)	<div><div><div>Practical Set – 6</div><div><div><div>1. Write a program to accept a number from user and print its cube. Ask user for continuity, if user says yes repeat the process. (Use do while loop)</div><div>2. The Restaurant Billing System is a computerized program designed to streamline the process of taking customer orders and generating accurate bills. It displays a menu of food items, allowing customers to select multiple items and specify their quantities. The program continuously accepts orders until the customer chooses to exit. Upon exit, it calculates the total bill and provides a detailed summary of the ordered items, including their quantities and prices.</div><div>3. Write a program to take start and end numbers from the user and print all even numbers in that range.</div><div>4. The Goto Statement - Password Authentication System is a program that simulates a secure login mechanism where a user is required to enter a correct password to gain access. The system allows up to three attempts, after which it locks the user out if they fail to enter the correct password. The program utilizes the goto statement to redirect execution back to the password input section if an incorrect password is entered.</div><div>5. Write a program to print following pattern.</div></div><div><table><tr><td><div><div>*</div><div>**</div><div>***</div><div>****</div><div>*****</div><div>(a)</div></div></td><td><div><div>*****</div><div>****</div><div>***</div><div>**</div><div>*</div><div>(b)</div></div></td><td><div><div>1</div><div>12</div><div>123</div><div>1234</div><div>12345</div><div>(c)</div></div></td><td><div><div>*</div><div>**</div><div>***</div><div>**</div><div>*</div><div>(d)</div></div></td></tr></table></div></div></div></div>	<div><div>*</div><div>**</div><div>***</div><div>****</div><div>*****</div><div>(a)</div></div>	<div><div>*****</div><div>****</div><div>***</div><div>**</div><div>*</div><div>(b)</div></div>	<div><div>1</div><div>12</div><div>123</div><div>1234</div><div>12345</div><div>(c)</div></div>	<div><div>*</div><div>**</div><div>***</div><div>**</div><div>*</div><div>(d)</div></div>
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7)	<div><div><div>Practical Set – 7</div><div><div><div>1. A teacher wants to store the marks of 20 students in a test and find the highest, lowest, and average marks.</div><div>2. Write a C program to implement a waiting list of customers at a restaurant where:<div><div><div>i. The user inputs the total number of customers in the queue.</div><div>ii. The system stores customer IDs in an array.</div><div>iii. The user enters the position of a customer who cancelled their reservation.</div><div>iv. The program removes the customer from the list and shifts the remaining customers forward.</div><div>v. Finally, the program displays the updated waiting list.</div></div></div></div></div></div></div></div>				

	<ol style="list-style-type: none"> Imagine a library where books are stored in a random order on a shelf. The librarian wants to arrange the books in ascending order based on their unique ID numbers to make them easier to find. A college wants to track the attendance of 3 students for 5 days using a matrix (2D Array). Concept: 2D Array to store attendance records (1 for present, 0 for absent). Write a program to store attendance for N students over M days and find the total days attended by each student. A company has two sales departments, and each department maintains a monthly sales record in the form of a matrix. The manager wants to combine the sales data from both departments to get the total sales for each month in each region. Write a C program to read sales data from two matrices (each representing a department's sales), add them, and display the total sales. Write a program that asks the user to enter a username and compares it with a stored username in a case-insensitive manner. 										
8.	<p>Practical Set – 8</p> <ol style="list-style-type: none"> Write a C program to find the maximum of three given numbers using a user-defined function. The function should accept three integer arguments and return the largest number among them. Electricity Bill Generator Write a function that accepts the number of units consumed and returns the total bill amount based on slabs. <table border="1"> <thead> <tr> <th>Units Range</th><th>Rate per Unit</th></tr> </thead> <tbody> <tr> <td>0 – 100 units</td><td>₹1.50</td></tr> <tr> <td>101 – 200 units</td><td>₹2.00</td></tr> <tr> <td>201 – 300 units</td><td>₹3.00</td></tr> <tr> <td>Above 300 units</td><td>₹5.00</td></tr> </tbody> </table> Write a C program that uses a recursive function to calculate the factorial of a given non-negative integer. Write a C program that uses a recursive function to generate the Fibonacci series up to n terms (entered by the user). 	Units Range	Rate per Unit	0 – 100 units	₹1.50	101 – 200 units	₹2.00	201 – 300 units	₹3.00	Above 300 units	₹5.00
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9.	<p>Practical Set – 9</p> <ol style="list-style-type: none"> Write a program to declare structure book having data members as book_name, book_pages, book_price. Accept this data and display it. Create a structure Product with fields: product ID, product name, quantity, and price. Write a program to input and display data for N products and calculate the total stock value (quantity × price) for each. Write a program using a nested structure where Student contains fields like name, roll number, and a nested structure Address that contains city and pincode. Accept and display details for 3 students. Define a structure Student with fields: name, roll number, and marks. Write a function to accept details of 5 students. Use another function to find and display the student with the highest marks. Define a struct Data and a union Data with the following members: <ol style="list-style-type: none"> An integer i 										

	<ul style="list-style-type: none"> ii) A float f iii) A character array str[20] <ol style="list-style-type: none"> 1. Assign values to all members in both structure and union. 2. Print the values and observe what gets retained or lost. 3. Display the size of structure and union using sizeof.
10.	Practical Set – 10 <ol style="list-style-type: none"> 1. Write a program that declares an integer variable, assigns a value to it, and uses a pointer to display both the value and the address of the variable. 2. Write a program to find product of two numbers using pointer. 3. Write a program to read n different integer numbers from keyboard and calculate the sum using pointer. 4. Write a program to do swapping of two elements using function with two pointers as arguments. 5. Write a program to find minimum of two numbers using pointer and function.
11.	Practical Set – 11 <ol style="list-style-type: none"> 1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function. 2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. 3. Write a C program that performs the following tasks: <ol style="list-style-type: none"> I. Creates (or opens) a file named "student.txt". II. Accepts a student's name and marks from the user. III. Writes the entered details to the file. IV. Closes the file after writing. V. Reopens the file in reading mode. VI. Reads and displays the contents stored in the file.