GIRIJANANDACHOWDHURYUNIVERSITY

Hathkhowapara, Azara, Guwahati781017, Assam

PROGRAMMING FOR PROBLEM SOLVING LABORATORY

LAB MANUAL

SUBJECT CODE: BCS23101P

Prepared by:-

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PROGRAMMING FOR PROBLEM SOLVING LABORATORY		L	T	P	C
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List of Lab Experiments					
Lab1	Familiarization with programming environment (editors, compilation, debugging etc.)				**2hours**
Lab 2	Simple computational problems using expressions and precedence				**2 hours**
Lab 3	Problems involving using if-then-else and switch statements				**2 hours**
Lab 4	Iterative problems e.g.,sum of series,factorial,Fibonacci series etc.				**4 hours**
Lab 5	1D, 2D Array manipulation: summation, finding odd/even in a set, string handling etc.				**4 hours**
Lab 6	Matrix problems (addition, multiplication etc.),String operations(finding length, concatenation, comparing etc.)				**4 hours**
Lab 7	Simple function illustrating the concepts, call by value				**2 hours**
Lab 8	Recursive functions for summation, Fibonacci series, and factorial				**4 hours**
Lab 9	Pointers, call by reference, passing arrays to functions, passing address of structure to function, passing array of structure to function, pointers and arrays, function pointer, dynamic allocation of block of memory and accessing the elements.				**4 hours**
Lab 10	File operations on text files, binary files.				**2 hours**
				Total	**30 hours**

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Lab 1 – Familiarization with Programming Environment

Program to print "Hello, World!"

```
#include <stdio.h>

int main() {
   printf("Hello, World!\n");
   return 0;
}
```

Output:

Hello, World!

Lab 2 – Simple Computational Problems

Program to calculate area and perimeter of a rectangle

```
#include <stdio.h>

int main() {
   float length, breadth, area, perimeter;

   printf("Enter length: ");
   scanf("%f", &length);
   printf("Enter breadth: ");
   scanf("%f", &breadth);

   area = length * breadth;
   perimeter = 2 * (length + breadth);

   printf("Area = %.2f\n", area);
   printf("Perimeter = %.2f\n", perimeter);
```

```
    return 0;
}
```

Output:

```
Enter length: 5
Enter breadth: 3
Area = 15.00
Perimeter = 16.00
```

Lab 3 – If-Else and Switch Statements

Program to find the largest of three numbers

```
#include <stdio.h>

int main() {
    int a, b, c;

    printf("Enter three numbers: ");
    scanf("%d %d %d", &a, &b, &c);

    if (a >= b && a >= c)
        printf("Largest number is %d\n", a);
    else if (b >= a && b >= c)
        printf("Largest number is %d\n", b);
    else
        printf("Largest number is %d\n", c);

    return 0;
}
```

Output:

```
Enter three numbers: 12 25 7
Largest number is 25
```

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Lab 4 – Iterative Problems

Program to print Fibonacci Series

```
#include <stdio.h>

int main() {
   int n, a = 0, b = 1, next, i;

   printf("Enter number of terms: ");
   scanf("%d", &n);

   printf("Fibonacci Series: ");
   for (i = 1; i <= n; i++) {
      printf("%d ", a);
      next = a + b;
      a = b;
      b = next;
   }

   return 0;
}
```

Output:

```
Enter number of terms: 6
Fibonacci Series: 0 1 1 2 3 5
```

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Lab 5 – 1D and 2D Array Manipulation

Program to find even and odd numbers in an array

```
#include <stdio.h>

int main() {
   int arr[10], i;

   printf("Enter 10 numbers:\n");
   for (i = 0; i < 10; i++) {
      scanf("%d", &arr[i]);
   }

   printf("Even numbers: ");
   for (i = 0; i < 10; i++) {
      if (arr[i] % 2 == 0)
         printf("%d ", arr[i]);
   }

   printf("\nOdd numbers: ");
   for (i = 0; i < 10; i++) {
      if (arr[i] % 2 != 0)
         printf("%d ", arr[i]);
   }

   return 0;
}
```

Output:

```
Enter 10 numbers:
10 15 22 33 40 55 12 8 9 6
Even numbers: 10 22 40 12 8 6
Odd numbers: 15 33 55 9
```

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Lab 6 – Matrix and String Operations

Program for Matrix Addition

```
#include <stdio.h>

int main() {
   int A[2][2], B[2][2], C[2][2];
   int i, j;

   printf("Enter elements of matrix A (2x2):\n");
   for (i = 0; i < 2; i++)
      for (j = 0; j < 2; j++)
         scanf("%d", &A[i][j]);

   printf("Enter elements of matrix B (2x2):\n");
   for (i = 0; i < 2; i++)
      for (j = 0; j < 2; j++)
         scanf("%d", &B[i][j]);

   for (i = 0; i < 2; i++)
      for (j = 0; j < 2; j++)
         C[i][j] = A[i][j] + B[i][j];

   printf("Resultant Matrix:\n");
   for (i = 0; i < 2; i++) {
      for (j = 0; j < 2; j++)
         printf("%d ", C[i][j]);
      printf("\n");
   }

   return 0;
}
```

Output:

```
Enter elements of matrix A (2x2):
1 2
3 4
```

Enter elements of matrix B (2x2):
5 6
7 8
Resultant Matrix:
6 8
10 12

Lab 7 – Functions (Call by Value)

Program to find square of a number using function

```
#include <stdio.h>

int square(int n) {
    return n * n;
}

int main() {
    int num;
    printf("Enter a number: ");
    scanf("%d", &num);
    printf("Square = %d\n", square(num));
    return 0;
}
```

Output:

Enter a number: 5
Square = 25

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Lab 8 – Recursive Functions

Program to find factorial using recursion

```
#include <stdio.h>

int factorial(int n) {
    if (n == 0)
        return 1;
    else
        return n * factorial(n - 1);
}

int main() {
    int num;
    printf("Enter a number: ");
    scanf("%d", &num);
    printf("Factorial of %d is %d\n", num, factorial(num));
    return 0;
}
```

Output:

```
Enter a number: 5
Factorial of 5 is 120
```

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Lab 9 – Pointers and Dynamic Memory

Program to swap two numbers using pointers

```
#include <stdio.h>

void swap(int *x, int *y) {
   int temp;
   temp = *x;
   *x = *y;
   *y = temp;
}

int main() {
   int a, b;
   printf("Enter two numbers: ");
   scanf("%d %d", &a, &b);

   printf("Before swap: a = %d, b = %d\n", a, b);
   swap(&a, &b);
   printf("After swap: a = %d, b = %d\n", a, b);
   return 0;
}
```

Output:

```
Enter two numbers: 10 20
Before swap: a = 10, b = 20
After swap: a = 20, b = 10
```

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Lab 10 – File Operations

Program to write and read from a file

```
#include <stdio.h>

int main() {
   FILE *fp;
   char ch;

   fp = fopen("sample.txt", "w");
   fprintf(fp, "Hello Students!\nWelcome to Programming Lab.");
   fclose(fp);

   fp = fopen("sample.txt", "r");
   printf("File Content:\n");
   while ((ch = fgetc(fp)) != EOF)
```

```
    fclose(fp);
    return 0;
}
```

Output:

File Content:
Hello Students!
Welcome to Programming Lab.
