**GALGOTIAS UNIVERSITY**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**



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| **SUBJECT** | **Programming for Problem Solving-C** | **PROGRAMME** | **B. Tech.** |
| **SUBJECT CODE** | **BCS0IT1003** | **SEMESTER** | **I** |
| **CREDITS** | **3** | **DURATION OF SEMESTER** | **12 Week** |
| **PREREQUISITE SUBJECTS** | **--** | **SESSION DURATION** | **4 Hours/Week** |
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**Lab manual programming c**

**LAB SHEET 1**

1. **Write a program to display “hello world” in C.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**printf("HELLO WORLD %d",);**

**getchar();**

**return 0;**

**}**

1. **Write a program to add two numbers (5&7) and display its sum.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**printf("5 + 7 = %d", 5 + 7);**

**getchar();**

**return 0;**

**}**

1. **Write a program to multiply two numbers (10&8) and display its product.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**printf("10 \* 8 = %d", 10 \* 8);**

**getchar();**

**Return 0;**

**}**

1. **Write a program to calculate area of a circle having its radius (r=5).**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int r = 5;**

**float pi = 3.14;**

**float area = pi \* r \* r;**

**printf("Area Of Circle Having Radius %d = %.3f", r, area);**

**getchar();**

**return 0;**

**}**

1. **Write a program to calculate area of an ellipse having its axes (minor=4cm, major=6cm).**

**#include <stdio.h>**

**#include <stdlib.h>**

**// Area Of Ellipse = pi \* a \* b = 3.14 \* 6 \* 4 = 75.36**

**int main()**

**{**

**system("CLS");**

**int a = 6, b = 4;**

**float area = 3.14 \* a \* b;**

**printf("Area Of Ellipse = %.3f", area);**

**getchar();**

**return 0;**

**}**

1. **Write a program to calculate simple interest for a given P=4000, T=2, R=5.5. (I = P\*T\*R/100)**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**float P = 4000, T = 2, R = 5.5;**

**float SI = P \* T \* R / 100;**

**printf("SIMPLE INTEREST = %.3f", SI);**

**getchar();**

**return 0;**

**}**

**LAB SHEET 2**

1. **Write a program to declare two integer and one float variables then initialize them to 10, 15, and 12.6. Also print the variable values in the screen.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int a = 10, b = 15;**

**float c = 12.6;**

**printf("a = %d\n", a);**

**printf("b = %d\n", b);**

**printf("c = %.2f", c);**

**getchar();**

**return 0;**

**}**

1. **Write a C program to prompt the user to input 3 integer values and print these values in forward and reversed order.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int a = 1, b = 2, c = 3;**

**printf("Forward Order --> %d %d %d\n", a, b, c);**

**printf("Reverse Order --> %d %d %d", c, b, a);**

**getchar();**

**return 0;**

**}**

1. **Write a program to calculate simple and compound interest.**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include<math.h>**

**int main()**

**{**

**system("CLS");**

**int p, t;**

**float r, si, amount, ci;**

**printf("Please enter principal,time and rate of interest\n");**

**scanf("%d%d%f", &p, &t, &r);**

**si = p \* t \* r / 100;**

**//Simple Interest formula is p\*t\*r**

**printf("\nSimple interest = %.3f", si);**

**//Compound Interest formula is below**

**amount = p \* pow((1 + r / 100), t);**

**ci = amount - p;**

**printf("\nCompound interest = %.3f", ci);**

**getchar();**

**return 0;**

**}**

1. **Write a program to swap two variables values with and without using third variables**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int a = 10, b = 20, c;**

**int x = 100, y = 200;**

**printf("\*\*\*\*\*\*\*\*\*\*\*\*\*SWAP USING 3rd VARIABLE\*\*\*\*\*\*\*\*\*\*\*\*\*\n\n");**

**printf("BEFORE SWAPPING --> a = %d , b = %d\n", a, b);**

**c = a;**

**a = b;**

**b = c;**

**printf("AFTER SWAPPING ---> a = %d , b = %d\n", a, b);**

**printf("\n\*\*\*\*\*\*\*\*\*\*\*\*\*SWAP WITHOUT USING 3rd VARIABLE\*\*\*\*\*\*\*\*\*\*\*\*\*\n\n");**

**printf("BEFORE SWAPPING --> x = %d , y = %d\n", x, y);**

**x = x + y;**

**y = x - y;**

**x = x - y;**

**printf("AFTER SWAPPING ---> x = %d , y = %d\n", x, y);**

**getchar();**

**return 0;**

**}**

1. **Write a program to check odd or even number (a) using modulus operator (b) using bitwise operator (c) without using bitwise and modulus operator (d) using conditional operator.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int n;**

**printf("Enter a Number: ");**

**scanf("%d", &n);**

**printf("\n\nODD - EVEN CHECK USING MODULUS OPERATOR\n");**

**if (n % 2 == 0)**

**printf("%d is EVEN\n", n);**

**else**

**printf("%d is ODD\n", n);**

**printf("\n\nODD - EVEN CHECK USING BITWISE OPERATOR\n");**

**if (n & 1)**

**printf("%d is ODD\n", n);**

**else**

**printf("%d is EVEN\n", n);**

**printf("\n\nODD - EVEN CHECK WITHOUT USING MODULUS AND BITWISE OPERATOR\n");**

**if (n / 2 \* 2 == n)**

**printf("%d is EVEN\n", n);**

**else**

**printf("%d is ODD\n", n);**

**printf("\n\nODD - EVEN CHECK USING CONDITIONAL OPERATOR\n");**

**(n % 2 == 0) ? printf("%d is EVEN\n", n) : printf("%d is ODD\n", n);**

**getchar();**

**return 0;**

**}**

1. **Print the value of y for given x=2 & z=4 and analyze the output.**

**a. y = x++ + ++x; b. y= ++x + ++x; c. y= ++x + ++x + ++x;**

**d. y = x>z; e. y= x>z? x:z; f. y = x&z; g. y= x>>2 + z<<1;**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int x = 2, z = 4, y;**

**y = x++ + ++x;**

**printf("y = x++ + ++x --> ");**

**printf("y = %d\n\n\n", y);**

**x = 2, z = 4;**

**y = ++x + ++x;**

**printf("y = ++x + ++x --> ");**

**printf("y = %d\n\n\n", y);**

**x = 2, z = 4;**

**y = ++x + ++x + ++x;**

**printf("y = ++x + ++x + ++x --> ");**

**printf("y = %d\n\n\n", y);**

**x = 2, z = 4;**

**y = x > z;**

**printf("y = x > z --> ");**

**printf("y = %d\n\n\n", y);**

**x = 2, z = 4;**

**y = x > z ? x : z;**

**printf("y = x > z ? x : z --> ");**

**printf("y = %d\n\n\n", y);**

**x = 2, z = 4;**

**y = x & z;**

**printf("y = x & z --> ");**

**printf("y = %d\n\n\n", y);**

**x = 2, z = 4;**

**y = x >> 2 + z << 1;**

**printf("y = x >> 2 + z << 1 --> ");**

**printf("y = %d\n\n\n", y);**

**getchar();**

**return 0;**

**}**

1. **Write a program to print the size of char, float, double and long double data types in C**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char a;**

**float b;**

**double c;**

**long d;**

**printf("CHAR SIZE = %d\n", sizeof(a));**

**printf("FLOAT SIZE = %d\n", sizeof(b));**

**printf("DOUBLE SIZE = %d\n", sizeof(c));**

**printf("LONG DOUBLE SIZE = %d\n", sizeof(d));**

**getchar();**

**return 0;**

**}**

**LAB SHEET 3**

1. **Write a program to produce the output as shown below:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | y |  | expressions | results |
| 6 | | 3 | | | x=y+3 | | x=6 |
| 6 | | 3 | | | x=y-2 | | x=1 |
| 6 | | 3 | | | x=y\*5 | | x=15 |
| 6 | | 3 | | | x=x/y | | x=2 |
| 6 | | 3 | | | x=x%y | x=0 |

**#include<stdio.h>**

**#include<stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int x=6,y=3;**

**printf("x\t\ty\t\texpressions\t results\n");**

**printf("6\t|\t3\t|\t x = y + 3\t| x=%d\n",y + 3);**

**printf("6\t|\t3\t|\t x = y - 2\t| x=%d\n",y - 2);**

**printf("6\t|\t3\t|\t x = y \* 5\t| x=%d\n",y \* 5);**

**printf("6\t|\t3\t|\t x = y / y\t| x=%d\n",y / y);**

**printf("6\t|\t3\t|\t x = x %% y\t| x=%d\n",x % y);**

**getchar();**

**return 0;**

**}**

**2. Given x=3.0, y=12.5, z= 523.3, A=300.0, B=1200.5, C=5300.3, Write a program to display the following:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **X A** | **y B** | **z= C=** | **3.0|**  **300.0|** | **12.5|**  **1200.5|** | **523.3|**  **5300.3|** |
| **X**  **Z** | **y** | **z=** | **|3.00** | **|12.50 |523.30** | |
| **A** | **B** | **C=** | **|300.00** | **|1200.50 |52300.30** | |

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**float X = 3.0, y = 12.5, z = 523.3, A = 300.0, B = 1200.5, C = 5300.3;**

**printf("X y z = %.1f| %.1f| %.1f|\n", X, y, z);**

**printf("A B C = %.1f| %.1f| %.1f|\n", A, B, C);**

**printf("------------------------------------------\n");**

**printf("X y z = |%.1f0 |%.1f0 |%.1f0\n", X, y, z);**

**printf("A B C = |%.1f0 |%.1f0 |%.1f0\n", A, B, C);**

**getchar();**

**return 0;**

**}**

1. **Demonstrate the differences among getch(), getche(), getchar(). Demonstrate the difference between scanf() & gets(), printf() & puts().**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include <conio.h>**

**int main()**

**{**

**system("CLS");**

**printf("Demonstrate the difference between scanf() & gets(), printf() & puts().\n");**

**char s[34], s1[34];**

**printf("Enter Your Name: ");**

**scanf("%s", &s1[0]);**

**gets(s);**

**puts(s);**

**printf("Your Name Is: %s", s1);**

**printf("\n\nDemonstrate the differences among getch(), getche(), getchar().\n");**

**printf("%c", getch()); //getch is non-standard, typically found in the old obsolete MS DOS header conio.h. It works just like getchar except it isn't blocking after the first keystroke, it allows the program to continue without the user pressing enter. It does not echo input to the screen.**

**printf("%c", getche()); //getche is the same as getch, also non-standard, but it echoes input to the screen.**

**printf("%c", getchar()); //It is a blocking call, since it requires the user to type a character then press enter. It echoes user input to the screen.**

**getchar();**

**return 0;**

**}**

**LAB SHEET 4**

1. **Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int num1, num2, num3;**

**printf("Enter three numbers\n");**

**scanf("%d %d %d", &num1, &num2, &num3);**

**if (num1 < num2 && num1 < num3)**

**{**

**printf("\n%d is the smallest\n", num1);**

**(num1 % 2 == 0) ? printf("%d is EVEN", num1) : printf("%d is ODD", num1);**

**}**

**else if (num2 < num3)**

**{**

**printf("\n%d is the smallest\n", num2);**

**(num2 % 2 == 0) ? printf("%d is EVEN", num2) : printf("%d is ODD", num2);**

**}**

**else**

**{**

**printf("\n%d is the smallest\n", num3);**

**(num3 % 2 == 0) ? printf("%d is EVEN", num3) : printf("%d is ODD", num3);**

**}**

**if (num1 > num2 && num1 > num3)**

**{**

**printf("\n%d is largest\n", num1);**

**(num1 % 2 == 0) ? printf("%d is EVEN", num1) : printf("%d is ODD", num1);**

**}**

**else if (num2 > num3)**

**{**

**printf("\n%d is largest\n", num2);**

**(num2 % 2 == 0) ? printf("%d is EVEN", num2) : printf("%d is ODD", num2);**

**}**

**else**

**{**

**printf("\n%d is largest\n", num3);**

**(num3 % 2 == 0) ? printf("%d is EVEN", num3) : printf("%d is ODD", num3);**

**}**

**getchar();**

**return 0;**

**}**

1. **Write a program to check whether input alphabet is vowel or not using if-else and switch statement.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char c;**

**printf("Enter a character: ");**

**scanf("%c", &c);**

**printf("\*\*\*\*\*\*\*\*\*\*\*\* VOWEL (A , E , I , O , U) check using IF-ELSE STATEMENT\*\*\*\*\*\*\*\*\*\*\*\*\n");**

**if (c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u' || c == 'A' || c == 'E' || c == 'I' || c == 'O' || c == 'U')**

**printf(" '%c' is a VOWEL", c);**

**else**

**printf(" '%c' is NOT A VOWEL", c);**

**printf("\n\n\*\*\*\*\*\*\*\*\*\*\*\* VOWEL (A , E , I , O , U) check using SWITCH STATEMENT\*\*\*\*\*\*\*\*\*\*\*\*\n");**

**switch (c)**

**{**

**case 'a':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'e':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'i':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'o':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'u':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'A':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'E':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'I':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'O':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**case 'U':**

**printf(" '%c' is a VOWEL", c);**

**break;**

**default:**

**printf(" '%c' is NOT A VOWEL", c);**

**break;**

**}**

**getchar();**

**return 0;**

**}**

1. **Write a program to get input of two or higher digit integer number and display in reverse order.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int n, reverse = 0, rem;**

**printf("Enter a number: ");**

**scanf("%d", &n);**

**while (n != 0)**

**{**

**rem = n % 10;**

**reverse = reverse \* 10 + rem;**

**n /= 10;**

**}**

**printf("Reversed Number: %d", reverse);**

**getchar();**

**return 0;**

**}**

1. **Write a program that asks a number and test the number whether it is multiple of 5 or not, divisible by 7 but not by eleven.**

**#include<stdio.h>**

**#include<stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int n;**

**printf("Enter a Number: ");**

**scanf("%d",&n);**

**(n%5==0)?printf("%d is Multiple of 5\n",n):printf("%d is Not A Multiple of 5\n",n);**

**(n%7==0)?((n%11==0)?printf("%d is Divisible By 7 & 11 both\n",n):printf("%d is Divisible By 7 But Not by 11\n",n)):((n%11==0)?printf("%d is Divisible By 11 But Not by 7\n",n):printf("%d is Neither Divisible By 11 & Nor by 7\n",n));**

**getchar();**

**return 0;**

**}**

1. **Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int year;**

**printf("Enter a year: ");**

**scanf("%d", &year);**

**if (year % 400 == 0)**

**printf("%d is a leap year.", year);**

**else if (year % 100 == 0)**

**printf("%d is not a leap year.", year);**

**else if (year % 4 == 0)**

**printf("%d is a leap year.", year);**

**else**

**printf("%d is not a leap year.", year);**

**getchar();**

**return 0;**

**}**

1. **Write a program to read the values of coefficients a, b and c of a quadratic equation ax2+bx+c=0 and find roots of the equation.**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include <math.h>**

**int main()**

**{**

**system("CLS");**

**double a, b, c, discriminant, root1, root2, realPart, imagPart;**

**printf("Enter coefficients a, b and c: ");**

**scanf("%lf %lf %lf", &a, &b, &c);**

**discriminant = b \* b - 4 \* a \* c;**

**if (discriminant > 0)**

**{**

**root1 = (-b + sqrt(discriminant)) / (2 \* a);**

**root2 = (-b - sqrt(discriminant)) / (2 \* a);**

**printf("root1 = %.2lf and root2 = %.2lf", root1, root2);**

**}**

**else if (discriminant == 0)**

**{**

**root1 = root2 = -b / (2 \* a);**

**printf("root1 = root2 = %.2lf;", root1);**

**}**

**else**

**{**

**realPart = -b / (2 \* a);**

**imagPart = sqrt(-discriminant) / (2 \* a);**

**printf("root1 = %.2lf+%.2lfi and root2 = %.2f-%.2fi", realPart, imagPart, realPart, imagPart);**

**}**

**getchar();**

**return 0;**

**}**

**LAB SHEET 5**

1. **Write a program to input two integer numbers and display the sum of even numbers between these two input numbers.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int start, end, sum = 0;**

**printf("Enter start and end value\n");**

**scanf("%d%d", &start, &end);**

**printf("\nSum of even no's from %d to %d is ", start, end);**

**while (start <= end)**

**{**

**if (start % 2 == 0)**

**{**

**sum = sum + start;**

**}**

**start++;**

**}**

**printf("%d\n", sum);**

**getchar();**

**return 0;**

**}**

1. **Write a program to find GCD (greates common divisor or HCF) and LCM (least common multiple) of two numbers.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int a, b, x, y, t, gcd, lcm;**

**printf("Enter two integers\n");**

**scanf("%d%d", &x, &y);**

**a = x;**

**b = y;**

**while (b != 0)**

**{**

**t = b;**

**b = a % b;**

**a = t;**

**}**

**gcd = a;**

**lcm = (x \* y) / gcd;**

**printf("Greatest common divisor of %d and %d = %d\n", x, y, gcd);**

**printf("Least common multiple of %d and %d = %d\n", x, y, lcm);**

**getchar();**

**return 0;**

**}**

1. **Write a program to display Fibonacci series of last term up to 300.**

**#include<stdio.h>**

**#include<stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int t1 = 0, t2 = 1, nextTerm = 0, n;**

**printf("Enter a positive number: ");**

**scanf("%d", &n);**

**printf("Fibonacci Series: %d, %d, ", t1, t2);**

**nextTerm = t1 + t2;**

**while (nextTerm <= n) {**

**printf("%d, ", nextTerm);**

**t1 = t2;**

**t2 = nextTerm;**

**nextTerm = t1 + t2;**

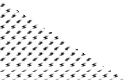
**}**

**getchar();**

**return 0;**

**}**

1. **Write a program to display the flag of Nepal using symbolic/HEX character in C.**



**#include <stdio.h>**

**#include <stdlib.h>**

**void triangleShape(int n)**

**{**

**int i, j;**

**for (i = 1; i <= n; i++)**

**{**

**for (j = 1; j <= i; j++)**

**{**

**printf("\* ");**

**}**

**printf("\n");**

**}**

**}**

**int main()**

**{**

**system("CLS");**

**int row;**

**printf("Enter number of rows: ");**

**scanf("%d", &row);**

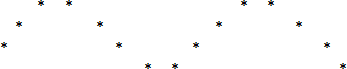
**triangleShape(row);**

**triangleShape(row);**

**getchar();**

**return 0;**

**}**

1. **Write a program to display the following.**

|  |  |
| --- | --- |
| **a.** | **b.** |
| **c.** | **d.** |

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int num = 5, r, c;**

**for (r = 1; r <= num; r++)**

**{**

**for (c = 1; c <= num; c++)**

**{**

**if ((c == 2 || c == 3 || c == 4) && (r == 1))**

**printf(" ");**

**else if ((c == 3) && (r == 2))**

**printf(" ");**

**else if ((c == 2 || c == 4) && (r == 3))**

**printf(" ");**

**else if ((c == 2 || c == 3 || c == 4) && (r == 4 || r == 5))**

**printf(" ");**

**else**

**printf("\*");**

**}**

**printf("\n");**

**}**

**getchar();**

**return 0;**

**}**

**LAB SHEET 6**

1. **Write a program to add, subtract, multiply and divide two integers using user defined type function with return type.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int add(int n1, int n2)**

**{**

**int result;**

**result = n1 + n2;**

**return result;**

**}**

**int subtract(int n1, int n2)**

**{**

**int result;**

**result = n1 - n2;**

**return result;**

**}**

**int multiply(int n1, int n2)**

**{**

**int result;**

**result = n1 \* n2;**

**return result;**

**}**

**int divide(int n1, int n2)**

**{**

**int result;**

**result = n1 / n2;**

**return result;**

**}**

**int main()**

**{**

**system("CLS");**

**int num1, num2;**

**printf("Enter two numbers: ");**

**scanf("%d %d", &num1, &num2);**

**printf("%d + %d = %d\n", num1, num2, add(num1, num2));**

**printf("%d - %d = %d\n", num1, num2, subtract(num1, num2));**

**printf("%d \* %d = %d\n", num1, num2, multiply(num1, num2));**

**printf("%d / %d = %d\n", num1, num2, divide(num1, num2));**

**getchar();**

**return 0;**

**}**

1. **Write a program to calculate sum of first 50 natural numbers using recursive function.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int addNumbers(int n)**

**{**

**if (n != 0)**

**return n + addNumbers(n - 1);**

**else**

**return n;**

**}**

**int main()**

**{**

**system("CLS");**

**printf("Sum of first 50 natural numbers: ");**

**printf("Sum = %d", addNumbers(50));**

**getchar();**

**return 0;**

**}**

1. **Define a function named fact() to calculate factorial of a number n and then write a program that uses this function fact() to calculate combination and permutation.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int factorial(int n)**

**{**

**int c;**

**long result = 1;**

**for (c = 1; c <= n; c++)**

**result = result \* c;**

**return (result);**

**}**

**int main()**

**{**

**system("CLS");**

**int n, r, npr, ncr;**

**int fact = 1;**

**printf("Enter n = ");**

**scanf("%d", &n);**

**printf("Enter r = ");**

**scanf("%d", &r);**

**npr = factorial(n) / factorial(n - r);**

**ncr = factorial(n) / (factorial(r) \* factorial(n - r));**

**printf("Factorial\n%d! = %d\n", n, factorial(n));**

**printf("Permutation\n%dp%d = %d\n", n, r, npr);**

**printf("Combination\n%dc%d = %d\n", n, r, ncr);**

**getchar();**

**return 0;**

**}**

1. **Write a recursive function to generate Fibonacci series.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int Fibonacci(int n)**

**{**

**if (n == 0)**

**return 0;**

**else if (n == 1)**

**return 1;**

**else**

**return (Fibonacci(n - 1) + Fibonacci(n - 2));**

**}**

**int main()**

**{**

**system("CLS");**

**int n, i = 0, c;**

**printf("Enter the number of fibbonanci tems you want: ");**

**scanf("%d", &n);**

**printf("Fibonacci series\n");**

**for (c = 1; c <= n; c++)**

**{**

**printf("%d ", Fibonacci(i));**

**i++;**

**}**

**getchar();**

**return 0;**

**}**

1. **Write a program that illustrates use of local, global and static variables**

**#include <stdio.h>**

**#include <stdlib.h>**

**int g; // global variable declaration**

**int main()**

**{**

**system("CLS");**

**// local variable declaration**

**int a, b;**

**static int abc = 90;**

**printf("Before Change , Static Variable , abc = %d\n", abc);**

**// actual initialization**

**a = 10;**

**b = 20;**

**g = a + b;**

**printf("LOCAL VARIABLE\n\nValue of a = %d, b = %d \nGLOBAL VARIABLE\n g = %d\n", a, b, g);**

**getchar();**

**return 0;**

**}**

**LAB SHEET 7**

1. **Write a program to enter 10 floating numbers in an array and display it.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**float a[10];**

**printf("Enter floating nos.\n");**

**for (int i = 0; i < 10; i++)**

**{**

**printf("Floating No. %d = ", i + 1);**

**scanf("%f", &a[i]);**

**}**

**printf("\n\nDISPLAYING NUMBERS\n\n");**

**for (int i = 0; i < 10; i++)**

**printf("Floating No. %d = %.4f\n", i + 1, a[i]);**

**getchar();**

**return 0;**

**}**

1. **Write a program to display largest and smallest element of an array defined in Q.No. 1.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int a[10], i, big, small;**

**printf("Enter the 10 elements of the array: \n\n");**

**for (i = 0; i < 10; i++)**

**scanf("%d", &a[i]);**

**big = a[0];**

**for (i = 1; i < 10; i++)**

**{**

**if (big < a[i])**

**{**

**big = a[i];**

**}**

**}**

**printf("\n\nThe largest element is: %d", big);**

**small = a[0];**

**for (i = 1; i < 10; i++)**

**{**

**if (small > a[i])**

**{**

**small = a[i];**

**}**

**}**

**printf("\n\nThe smallest element is: %d", small);**

**getchar();**

**return 0;**

**}**

1. **Write a program to initialize one dimensional array of size 8 and display the sum and average of array elements**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int Arr[8], i, sum = 0;**

**for (i = 0; i < 8; i++)**

**{**

**printf("Enter element %d : ", i + 1);**

**scanf("%d", &Arr[i]);**

**sum += Arr[i];**

**}**

**printf("\nThe sum of the array is : %d", sum);**

**printf("\nThe average of the array is : %0.2f", (float)sum / 8);**

**getchar();**

**return 0;**

**}**

1. **Write a program to read two matrices of order 3 \* 2, add them and display the resultant matrix in matrix form.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int a[5][5], b[5][5], sum[5][5], i, j;**

**printf("\nEnter elements of 1st matrix:\n");**

**for (i = 0; i < 3; ++i)**

**for (j = 0; j < 2; ++j)**

**{**

**printf("Enter element a%d%d: ", i + 1, j + 1);**

**scanf("%d", &a[i][j]);**

**}**

**printf("Enter elements of 2nd matrix:\n");**

**for (i = 0; i < 3; ++i)**

**for (j = 0; j < 2; ++j)**

**{**

**printf("Enter element a%d%d: ", i + 1, j + 1);**

**scanf("%d", &b[i][j]);**

**}**

**for (i = 0; i < 3; ++i)**

**for (j = 0; j < 2; ++j)**

**{**

**sum[i][j] = a[i][j] + b[i][j];**

**}**

**printf("\nSum of two matrices: \n");**

**for (i = 0; i < 3; ++i)**

**for (j = 0; j < 2; ++j)**

**{**

**printf("%d ", sum[i][j]);**

**if (j == 2 - 1)**

**{**

**printf("\n\n");**

**}**

**}**

**getchar();**

**return 0;**

**}**

1. **Write a program to multiply two 3\*3 matrix.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int i, j, m, n, k, a[5][5], b[5][5], c[5][5];**

**printf("Enter order of matrix :\n");**

**scanf("%d%d", &m, &n);**

**printf("Enter matrix elements of first matrix.....\n");**

**for (i = 0; i < m; i++)**

**for (j = 0; j < n; j++)**

**scanf("%d", &a[i][j]);**

**printf("Enter matrix elements of second matrix.....\n");**

**for (i = 0; i < m; i++)**

**for (j = 0; j < n; j++)**

**scanf("%d", &b[i][j]);**

**for (i = 0; i < m; i++)**

**for (j = 0; j < n; j++)**

**{**

**c[i][j] = 0;**

**for (k = 0; k < n; k++)**

**c[i][j] = c[i][j] + a[i][k] \* b[k][j];**

**}**

**printf("Resultant matrix .....\n");**

**for (i = 0; i < m; i++)**

**{**

**for (j = 0; j < n; j++)**

**printf("%d ", c[i][j]);**

**printf("\n");**

**}**

**getchar();**

**return 0;**

**}**

1. **Write a program to read a string and check for palindrome without using string related function (a string is palindrome if its half is mirror by itself eg: abcdcba).**

**#include <stdio.h>**

**#include <string.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char s[1000];**

**int i, n, c = 0;**

**printf("Enter the string : ");**

**gets(s);**

**n = strlen(s);**

**for (i = 0; i < n / 2; i++)**

**{**

**if (s[i] == s[n - i - 1])**

**c++;**

**}**

**if (c == i)**

**printf("string is palindrome");**

**else**

**printf("string is not palindrome");**

**getchar();**

**return 0;**

**}**

**LAB SHEET 8**

1. **Write a program to find biggest among three numbers using pointer.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int num1, num2, num3;**

**int \*p1, \*p2, \*p3;**

**printf("Enter First Number: ");**

**scanf("%d", &num1);**

**printf("Enter Second Number: ");**

**scanf("%d", &num2);**

**printf("Enter Third Number: ");**

**scanf("%d", &num3);**

**p1 = &num1;**

**p2 = &num2;**

**p3 = &num3;**

**if (\*p1 > \*p2)**

**{**

**if (\*p1 > \*p3)**

**{**

**printf("%d is the largest number", \*p1);**

**}**

**else**

**{**

**printf("%d is the largest number", \*p3);**

**}**

**}**

**else**

**{**

**if (\*p2 > \*p3)**

**{**

**printf("%d is the largest number", \*p2);**

**}**

**else**

**{**

**printf("%d is the largest number", \*p3);**

**}**

**}**

**getchar();**

**return 0;**

**}**

1. **Write a program to find the sum of all the elements of an array using pointers.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int sum\_array\_elements(int arr[], int n)**

**{**

**if (n < 0)**

**{**

**return 0;**

**}**

**else**

**{**

**return arr[n] + sum\_array\_elements(arr, n - 1);**

**}**

**}**

**int main()**

**{**

**system("CLS");**

**int array[] = {1, 2, 3, 4, 5, 6, 7};**

**int sum;**

**sum = sum\_array\_elements(array, 6);**

**printf("\nSum of array elements is:%d", sum);**

**getchar();**

**return 0;**

**}**

1. **Write a program to swap value of two variables using pointer.**

**#include <stdio.h>**

**#include <stdlib.h>**

**void swap(int \*x, int \*y)**

**{**

**int t;**

**t = \*x;**

**\*x = \*y;**

**\*y = t;**

**}**

**int main()**

**{**

**system("CLS");**

**int num1, num2;**

**printf("Enter value of num1: ");**

**scanf("%d", &num1);**

**printf("Enter value of num2: ");**

**scanf("%d", &num2);**

**printf("Before Swapping: num1 is: %d, num2 is: %d\n", num1, num2);**

**swap(&num1, &num2);**

**printf("After Swapping: num1 is: %d, num2 is: %d\n", num1, num2);**

**getchar();**

**return 0;**

**}**

1. **Write a program to read a sentence and count the number of characters &words in that sentence.**

**#include <stdio.h>**

**#include <string.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char str[50];**

**int i = 0, word = 0, chr = 0;**

**printf("\nEnter Your String: ");**

**gets(str);**

**while (str[i] != '\0')**

**{**

**if (str[i] == ' ')**

**{**

**word++;**

**chr++;**

**}**

**else**

**chr++;**

**i++;**

**}**

**printf("\nNumber of characters: %d", chr);**

**printf("\nNumber of words: %d", word + 1);**

**getchar();**

**return 0;**

**}**

1. **Write a program to read a sentence & delete all the white spaces. Replace all “.” by “:”.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int i, len = 0, j;**

**char str[] = "Remove white spaces";**

**printf("String before removing all the white spaces : %s\n", str);**

**len = sizeof(str) / sizeof(str[0]);**

**for (i = 0; i < len; i++)**

**{**

**if (str[i] == ' ')**

**{**

**for (j = i; j < len; j++)**

**{**

**str[j] = str[j + 1];**

**}**

**len--;**

**}**

**}**

**printf("String after removing all the white spaces : %s", str);**

**getchar();**

**return 0;**

**}**

1. **Write a program to concatenate two strings.**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char s1[100] = "programming ", s2[] = "is awesome";**

**int length, j;**

**length = 0;**

**while (s1[length] != '\0')**

**{**

**++length;**

**}**

**for (j = 0; s2[j] != '\0'; ++j, ++length)**

**{**

**s1[length] = s2[j];**

**}**

**s1[length] = '\0';**

**printf("After concatenation: ");**

**puts(s1);**

**getchar();**

**return 0;**

**}**

1. **Write a program to compare two strings.**

**#include <stdio.h>**

**#include <string.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char str1[20];**

**char str2[20];**

**int value;**

**printf("Enter the first string : ");**

**scanf("%s", str1);**

**printf("Enter the second string : ");**

**scanf("%s", str2);**

**value = strcmp(str1, str2);**

**if (value == 0)**

**printf("strings are same");**

**else**

**printf("strings are not same");**

**getchar();**

**return 0;**

**}**

1. **Write a program to sort 5 string words stored in an array of pointers.**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include <string.h>**

**int main()**

**{**

**system("CLS");**

**char \*T;**

**int I, J, K;**

**char \*ARRAY[5] = {"SUNIL", "ANIL", "DILIP", "JAY", "BHARAT"};**

**for (I = 0; I < 5; I++)**

**{**

**printf("% s \t", ARRAY[I]);**

**}**

**printf("\n");**

**for (I = 0; I < 4; I++)**

**{**

**for (J = 0; J < 4 - I; J++)**

**{**

**K = strcmp(ARRAY[J], ARRAY[J + 1]);**

**if (K > 0)**

**{**

**T = ARRAY[J];**

**ARRAY[J] = ARRAY[J + 1];**

**ARRAY[J + 1] = T;**

**}**

**}**

**}**

**for (I = 0; I < 5; I++)**

**{**

**printf("% s \t", ARRAY[I]);**

**}**

**getchar();**

**return 0;**

**}**

1. **Write a program to print the following pattern U N**

**U N I V**

**U N I V E R**

**U N I V E R S I**

**U N I V E R S I T Y U N I V E R S I**

**U N I V E R U N I V**

**U N**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**int i, j;**

**for (i = 1; i <= 5; ++i)**

**{**

**for (j = 1; j <= 2 \* i; j = ++j)**

**{**

**switch (j)**

**{**

**case 1:**

**printf("U N");**

**break;**

**case 3:**

**printf(" I V");**

**break;**

**case 5:**

**printf(" E R");**

**break;**

**case 7:**

**printf(" S I");**

**break;**

**case 9:**

**printf(" T Y");**

**break;**

**}**

**}**

**printf("\n");**

**}**

**for (i = 1; i <= 4; ++i)**

**{**

**for (j = 1; j <= 10 - 2 \* i; ++j)**

**{**

**switch (j)**

**{**

**case 1:**

**printf("U N");**

**break;**

**case 3:**

**printf(" I V");**

**break;**

**case 5:**

**printf(" E R");**

**break;**

**case 7:**

**printf(" S I");**

**break;**

**case 9:**

**printf(" T Y");**

**break;**

**}**

**}**

**printf("\n");**

**}**

**getchar();**

**return 0;**

**}**

**LAB SHEET 9**

1. **Create a structure named company which has name, address, phone and noOfEmployee as member variables. Read name of company, its address, phone and noOfEmployee. Finally display these members’ value.**

**#include <stdio.h>**

**#include <stdlib.h>**

**struct company**

**{**

**char name[30];**

**char address[50];**

**int phone\_no;**

**int noOfEmployee;**

**};**

**int main()**

**{**

**system("CLS");**

**struct company s1 = {"ADITYA", "AB STREET NOIDA", 987654};**

**struct company s2 = {"MUKUL", "CD STREET NOIDA", 345456};**

**struct company s3 = {"YOGESH", "EF STREET NOIDA", 678665};**

**printf("No. Of Employee's = 3\n");**

**printf("\nEmployee 1 DETAILS\nEmployee Name = %s\nEmployee Address = %s\nEmployee Phone Number = %d", s1.name, s1.address, s1.phone\_no);**

**printf("\n\nEmployee 2 DETAILS\nEmployee Name = %s\nEmployee Address = %s\nEmployee Phone Number = %d", s2.name, s2.address, s2.phone\_no);**

**printf("\n\nEmployee 3 DETAILS\nEmployee Name = %s\nEmployee Address = %s\nEmployee Phone Number = %d", s3.name, s3.address, s3.phone\_no);**

**getchar();**

**return 0;**

**}**

1. **Write a program to enter to Cartesian coordinate points and display the distance between them.**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include <math.h>**

**int main()**

**{**

**system("CLS");**

**int x1, x2, y1, y2, X, Y;**

**float distance;**

**printf("Enter 1st X - Coordinate and 1st Y - Coordinate : ");**

**scanf("%d%d", &x1, &y1);**

**printf("Enter 2nd X - Coordinate and 2nd Y - Coordinate : ");**

**scanf("%d%d", &x2, &y2);**

**X = (x1 - x2);**

**Y = (y1 - y2);**

**distance = (X \* X) + (Y \* Y);**

**printf("Distance between points (%d,%d) and (%d,%d) = %.3f", x1, y1, x2, y2, sqrt(distance));**

**getchar();**

**return 0;**

**}**

1. **Write a function which accepts structure as argument and returns structure to the calling program.**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include <string.h>**

**struct student**

**{**

**int id;**

**char name[20];**

**float percentage;**

**};**

**void func(struct student record);**

**int main()**

**{**

**system("CLS");**

**struct student record;**

**record.id = 1;**

**strcpy(record.name, "Raju");**

**record.percentage = 86.5;**

**func(record);**

**getchar();**

**return 0;**

**}**

**void func(struct student record)**

**{**

**printf(" Id is: %d \n", record.id);**

**printf(" Name is: %s \n", record.name);**

**printf(" Percentage is: %f \n", record.percentage);**

**}**

1. **Define a structure “complex” (typedef) to read two complex numbers and perform addition, subtraction of these two complex numbers and display the result.**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include <string.h>**

**typedef struct complex**

**{**

**int real;**

**int img;**

**} complex;**

**void display(complex c)**

**{**

**printf("REAL part = %d\n", c.real);**

**printf("IMAGINARY part = %d\n", c.img);**

**}**

**int main()**

**{**

**system("CLS");**

**complex c\_no[2];**

**for (int i = 0; i < 2; i++)**

**{**

**printf("Enter REAL part of COMPLEX NO. %d: ", i + 1);**

**scanf("%d", &c\_no[i].real);**

**printf("Enter IMAGINARY part of COMPLEX NO. %d: ", i + 1);**

**scanf("%d", &c\_no[i].img);**

**}**

**for (int i = 0; i < 2; i++)**

**{**

**display(c\_no[i]);**

**}**

**printf("Addition = %d + %d i\n", (c\_no[0].real + c\_no[1].real), (c\_no[0].img + c\_no[1].img));**

**printf("Subtraction = %d - %d i\n", (c\_no[0].real - c\_no[1].real), (c\_no[0].img - c\_no[1].img));**

**getchar();**

**return 0;**

**}**

1. **Write a program to read RollNo, Name, Address, Age & average-marks of 12 students in the BCT class and display the details from function.**

**#include <stdio.h>**

**#include <stdlib.h>**

**typedef struct students**

**{**

**int rNo;**

**char name[20];**

**char addr[20];**

**int age;**

**int marks;**

**} stu;**

**void display(stu ss, int n)**

**{**

**printf("\n\nStudent - %d INFORMATION\n",n+1);**

**printf("Roll No. = %d\n", ss.rNo);**

**printf("Name = %s\n", ss.name);**

**printf("Address = %s\n", ss.addr);**

**printf("Age = %d\n", ss.age);**

**printf("Marks = %d\n", ss.marks);**

**}**

**int main()**

**{**

**system("CLS");**

**stu s[2];**

**float avg = 0;**

**for (int i = 0; i < 2; i++)**

**{**

**printf("\nEnter Roll No. of Student - %d: ", i + 1);**

**scanf("%d", &s[i].rNo);**

**printf("Enter Name of Student - %d: ", i + 1);**

**scanf("%s", &s[i].name);**

**printf("Enter Address of Student - %d: ", i + 1);**

**scanf("%s", &s[i].addr);**

**printf("Enter Age of Student - %d: ", i + 1);**

**scanf("%d", &s[i].age);**

**printf("Enter Marks of Student - %d: ", i + 1);**

**scanf("%d", &s[i].marks);**

**}**

**for (int i = 0; i < 2; i++)**

**{**

**display(s[i], i);**

**}**

**for (int i = 0; i < 2; i++)**

**{**

**avg += s[i].marks;**

**}**

**printf("AVERAGE MARKS OF 2 STUDENTS IS %d", avg);**

**getchar();**

**return 0;**

**}**

**LAB SHEET 10**

1. **Write characters into a file “filec.txt”. The set of characters are read form the keyboard until an enterkey is pressed (use putc() and getc() function).**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char ch;**

**FILE \*file\_pointer;**

**file\_pointer = fopen("filec.txt", "w");**

**if (file\_pointer == NULL)**

**{**

**printf("failed to open file.");**

**exit(1);**

**}**

**do**

**{**

**ch = getchar();**

**putc(ch, file\_pointer);**

**} while (ch != '\n');**

**fclose(file\_pointer);**

**getchar();**

**return 0;**

**}**

1. **Read characters form file “filec.txt” created in question 1. Also count the number of characters in the file (use fputs() and fgets() function).**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char ch;**

**FILE \*file\_pointer;**

**file\_pointer = fopen("filec.txt", "r");**

**if (file\_pointer == NULL)**

**{**

**printf("failed to open file.");**

**exit(1);**

**}**

**while (1)**

**{**

**ch = getc(file\_pointer);**

**if (ch == EOF)**

**{**

**break;**

**}**

**printf("%c", ch);**

**}**

**fclose(file\_pointer);**

**getchar();**

**return 0;**

**}**

1. **Write name, age and height of a person into a data file “person.txt” and read it (use fprintf() and fscanf() function)**

**#include <stdio.h>**

**#include <stdlib.h>**

**int main()**

**{**

**system("CLS");**

**char name[20];**

**int age;**

**float height;**

**FILE \*file\_pointer;**

**file\_pointer = fopen("person.txt", "w");**

**if (file\_pointer == NULL)**

**{**

**printf("failed to open file.");**

**exit(1);**

**}**

**printf("Enter name:");**

**scanf("%s", name);**

**printf("Enter Age:");**

**scanf("%d", &age);**

**printf("Enter height:");**

**scanf("%f", &height);**

**fprintf(file\_pointer, " %s %d %f", name, age, height);**

**fclose(file\_pointer);**

**printf("\n\nInformation read from file are :\n\n");**

**fscanf(file\_pointer, " %s %d %f", name, &age, &height);**

**printf("Name:%s\n", name);**

**printf("Age:%d\n", age);**

**printf("Height:%f\n", height);**

**getchar();**

**return 0;**

**}**