**Module -3 introduction To OOPS Programming**

**Lab Exercise**

* **Introduction To C++:-**

🡪1. First C++ Program: Hello World

o Write a simple C++ program to display "Hello, World!".

**Objective:** Understand the basic structure of a C++ program, including #include, main(), and cout.

Ans.

#include<iostream>

using namespace std;

int main(){

cout<<"Hello World"<<endl;

return 0;

}

-------------------------------------------------------------------------------------

🡪2. Basic Input/Output

o Write a C++ program that accepts user input for their name and age and then displays a personalized greeting.

**Objective:** Practice input/output operations using cin and cout.

Ans.

#include<iostream>

using namespace std;

int main(){

int age;

char name[100];

cout<<" Enter Your Name= ";

cin>>name;

cout<<" Enter Your Age= ";

cin>>age;

cout<<" Hi,"<<name<<" Your Current Age is "<<age<<endl;

return 0;

}

-------------------------------------------------------------------------------------

🡪3. POP vs. OOP Comparison Program

Write two small programs: one using Procedural Programming (POP) to calculate the area of a rectangle, and another using Object-Oriented Programming (OOP) with a class and object for the same task.

**Objective**: Highlight the difference between POP and OOP approaches.

Ans.

🡪In Pop(Procedural Oriented Programming):-

#include<stdio.h>

int main(){

int length,width,area;

printf("\n Enter the Length is= ");

scanf("%d",&length);

printf("\n Enter the Width is= ");

scanf("%d",&width);

area=length\*width;

printf("\n Length is =%d",length);

printf("\n width is =%d",width);

printf("\n Area is =%d",area);

return 0;

}

🡪In OOP(Object Oriented Programming):

#include<iostream>

using namespace std;

class area{

int length,width,area;

public:

void getdata(){

cout<<"Enter the Length= ";

cin>>length;

cout<<"Enter the width= ";

cin>>width;

}

void display(){

area=length\*width;

cout<<"Length= "<<length<<endl<<"Width= "<<width<<endl<<"Area= "<<area<<endl;

}

};

int main(){

area a;

a.getdata();

a.display();

return 0;

}

------------------------------------------------------------------------------------

🡪4.Setting Up Development Environment

o Write a program that asks for two numbers and displays their sum. Ensure this is done after setting up the IDE (like Dev C++ or CodeBlocks).

o **Objective**: Help students understand how to install, configure, and run programs in an IDE.

**Ans**.

#include<iostream>

using namespace std;

int main(){

int num1,num2,sum;

cout<<"Enter The Number1= and Number2= ";

cin>>num1>>num2;

sum=num1+num2;

cout<<"Sum of "<<num1<<" And "<<num2<<" is = "<<sum;

return 0;

}

------------------------------------------------------------------------------------

* **Variable ,Data Type And Operator:**-

🡪1. Variables and Constants

o Write a C++ program that demonstrates the use of variables and constants. Create variables of different data types and perform operations on them.

o **Objective**: Understand the difference between variables and constants

🡪Ans.

#include<iostream>

using namespace std;

int main(){

int num1,num2;

cout<<"Enter the num1= ";

cin>>num1;

cout<<"Enter the num2= ";

cin>>num2;

bool temp=true;

while(temp){

char choice;

cout<<"'+'. Addition "<<endl;

cout<<"'-'. Subtraction "<<endl;

cout<<"'\*'. Multiplication"<<endl;

cout<<"'/'. Division "<<endl;

cout<<"'E'. Exit "<<endl;

cout<<"Enter your Choice =";

cin>>choice;

switch(choice){

case '+':cout<<"Addition is= "<<num1+num2<<endl;

break;

case '-':cout<<"Subtraction is= "<<num1-num2<<endl;

break;

case '\*':cout<<"Multiplication is= "<<num1\*num2<<endl;

break;

case '/':

float ans;

ans=(float)num1/num2;

cout<<"Division is= "<<ans<<endl;

break;

case 'E':

temp=false;

break;

default:cout<<"Enter Valid Input "<<endl;

}

}

return 0;

}

🡪2.Type Conversion

o Write a C++ program that performs both implicit and explicit type conversions and prints the results.

o Objective: Practice type casting in C++

Ans:-

#include<iostream>

using namespace std;

int main(){

//implicit Type convertion

int a=10;

float b=a;

cout<<"Implicit convertion "<<endl;

cout<<"Integer value= "<<a<<endl;

cout<<" converted into float = "<<b<<endl;

float f=3.14;

int i=(int)f;

cout<<"Explicit Convertion "<<endl;

cout<<" Float Value= "<<f<<endl;

cout<<"converted in int = "<<i<<endl;

double d=9.99;

int n=static\_cast<int>(d);

cout<<"use static cast "<<endl;

cout<<"Double value= "<<d<<endl;

cout<<"converted into int ="<<n<<endl;

return 0;

}

-----------------------------------------------------------------------------------

🡪3. Operator Demonstration

o Write a C++ program that demonstrates arithmetic, relational, logical, and bitwise operators. Perform operations using each type of operator and display the results.

o Objective: Reinforce understanding of different types of operators in C++.

**Ans**.

#include<iostream>

#include<string>

using namespace std;

int main(){

int num1,num2;

bool temp=true;

while(temp){

cout<<"A. Arithmetic Operator"<<endl;

cout<<"B. Bitwise Operator"<<endl;

cout<<"R. Relational Operator"<<endl;

cout<<"L. Logical Operator"<<endl;

cout<<"E. Exit"<<endl;

char choice;

cout<<"Enter Your Choice= ";

cin>>choice;

switch(choice){

case 'A':

cout<<"A. Addition"<<endl;

cout<<"S. Subtraction"<<endl;

cout<<"M. Multiplication"<<endl;

cout<<"D. division"<<endl;

cout<<"E. Exit"<<endl;

char ch1;

cout<<"Enter Your Choice= ";

cin>>ch1;

switch(ch1){

case 'A':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<"Addition is= "<<num1+num2<<endl;

break;

case 'S':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<"subtraction is= "<<num1-num2<<endl;

break;

case 'M':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<"multiplication is= "<<num1\*num2<<endl;

break;

case 'D':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

float ans;

ans=(float)num1/num2;

cout<<"Division is= "<<ans<<endl;

break;

Default:

cout<<"Enter Valid Input"<<endl;

}

break;

case 'B':

cout<<"1. And(&) operator"<<endl;

cout<<"2. Or(|) operator"<<endl;

cout<<"3. Eor(^) operator"<<endl;

cout<<"4. not(~) operator"<<endl;

cout<<"5. right shift(>>) operator"<<endl;

cout<<"6. left shift(>>) operator"<<endl;

int n;

cout<<"Enter your choice= ";

cin>>n;

switch(n){

case 1:

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" & "<<num2<<"is = "<<(num1&num2)<<endl;

break;

case 2:

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" | "<<num2<<"is = "<<(num1|num2)<<endl;

break;

case 3:

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" ^ "<<num2<<"is = "<<(num1^num2)<<endl;

break;

case 4:

cout<<"Enter the num1 = ";

cin>>num1;

cout<<"(~"<<num1<<") = "<<(~num1)<<endl;

break;

case 5:

cout<<"Enter the num = ";

cin>>num1;

cout<<num1<<">>1 = "<<(num1>>1)<<endl;

break;

case 6:

cout<<"Enter the num = ";

cin>>num1;

cout<<num1<<"<<1 = "<<(num1<<1)<<endl;

break;

}

break;

case 'R':

cout<<"g. Greater than"<<endl;

cout<<"l. Less than"<<endl;

cout<<"n. Greater than Equal to "<<endl;

cout<<"m. Less than equal to"<<endl;

cout<<"e. Equal to "<<endl;

cout<<"r. Not Equal to"<<endl;

cout<<"E. Exit"<<endl;

char ch2;

cout<<"Enter Your Choice= "<<endl;

cin>>ch2;

switch(ch2){

case 'g':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<"> "<<num2<<" is = "<<(num1>num2)<<endl;;

break;

case 'l':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" < "<<num2<<" is = "<<(num1<num2)<<endl;;

break;

case 'n':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" >= "<<num2<<" is ="<<(num1>=num2)<<endl;;

break;

case 'm':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" <= "<<num2<<" is ="<<(num1<=num2)<<endl;;

break;

case 'e':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" == "<<num2<<" is ="<<(num1==num2)<<endl;;

break;

case 'r':

cout<<"Enter the num1 and num2= ";

cin>>num1>>num2;

cout<<num1<<" != "<<num2<<" is ="<<(num1!=num2)<<endl;;

break;

default:

cout<<"Enter Valid Detail"<<endl;

}

break;

case 'L':

int c1,c2;

cout<<"A. Logical and"<<endl;

cout<<"O. Logical Or"<<endl;

cout<<"N. Logical not"<<endl;

cout<<"E. Exit"<<endl;

char ch3;

cout<<"Enter Your Choice= ";

cin>>ch3;

switch(ch3){

case 'A':

cout<<"Enter the C1 and c2= ";

cin>>c1>>c2;

cout<<c1<<" && "<<c2<<" is = "<<(c1&&c2)<<endl;

break;

case 'O':

cout<<"Enter the C1 and c2= ";

cin>>c1>>c2;

cout<<c1<<" || "<<c2<<" is = "<<(c1||c2)<<endl;

break;

case 'N':

cout<<"Enter the C1= ";

cin>>c1;

cout<<" ! "<<c1<<" is = "<<!(c1)<<endl;

break;

default:cout<<"Enter valid Input"<<endl;

}

break;

case 'E':

temp=false;

break;

default:

cout<<"Enter Valid Input"<<endl;

}

}

return 0;

}

-------------------------------------------------------------------------------------

* **Control Flow Statement:-**

🡪1. Grade Calculator

o Write a C++ program that takes a student’s marks as input and calculates the grade based on if-else conditions.

o **Objective**: Practice conditional statements (if-else).

Ans.

#include<iostream>

using namespace std;

int main(){

int marks;

cout<<"Enter the student marks= ";

cin>>marks;

cout<<endl;

char grade;

if(marks>80){

grade='A';

}

else if(marks<=80 && marks>=50){

grade='B';

}

else if(marks<50 && marks>=35){

grade='C';

}

else{

grade='D';

}

cout<<"Grade Obtain By Student is = "<<grade<<endl;

return 0;

}

-------------------------------------------------------------------------------------

🡪2. Number Guessing Game

o Write a C++ program that asks the user to guess a number between 1 and 100. The program should provide hints if the guess is too high or too low. Use loops to allow the user multiple attempts.

o **Objective**: Understand while loops and conditional logic.

**Ans**.

#include<iostream>

using namespace std;

int main(){

int num=47;

int guess;

int count=10;

while(count!=0){

cout<<"Total Remaining Attempt= "<<count<<endl;

cout<<"Guess the number between 1 To 100 =";

cin>>guess;

cout<<endl;

if(guess==47){

cout<<"You Guess Correct number,You Won The Car."<<endl;

break;

}

else if(guess>47){

cout<<"You Guess To high number"<<endl;

}

else{

cout<<"You Guess To low Number"<<endl;

}

count--;

}

return 0;

}

-----------------------------------------------------------------------------------

🡪3. Multiplication Table

o Write a C++ program to display the multiplication table of a given number using a for loop.

o **Objective**: Practice using loops.

Ans.

#include<iostream>

using namespace std;

int main(){

int num,i;

cout<<"Enter The Number = ";

cin>>num;

cout<<"Multiplication Table Of Given Number "<<num<<" is ="<<endl;

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

cout<<num<<" "<<i<<" "<<num\*i<<endl;

}

return 0;

}

------------------------------------------------------------------------------------

🡪4. Nested Control Structures

o Write a program that prints a right-angled triangle using stars (\*) with a nested loop.

o **Objective**: Learn nested control structures.

**Ans**.

#include<iostream>

using namespace std;

int main(){

int row,i,j;

cout<<"Enter the Row= ";

cin>>row;

for(i=1;i<=row;i++){

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

cout<<"\* ";

}

cout<<endl;

}

return 0;

}

-------------------------------------------------------------------------------------

* **Function And Scope:**-

🡪1. Simple Calculator Using Functions

o Write a C++ program that defines functions for basic arithmetic operations (add, subtract, multiply, divide). The main function should call these based on user input.

o **Objective**: Practice defining and using functions in C++.

**Ans**.

#include<iostream>

using namespace std;

void add(int n1,int n2){

cout<<"Addition Of "<<n1<<" And "<<n2<<" is = "<<n1+n2<<endl;

cout<<endl<<endl;

}

void sub(int n1,int n2){

cout<<"Subtraction Of "<<n1<<" And "<<n2<<" is = "<<n1-n2<<endl;

cout<<endl<<endl;

}

void mul(int n1,int n2){

cout<<"Multiplication Of "<<n1<<" And "<<n2<<" is = "<<n1\*n2<<endl;

cout<<endl<<endl;

}

void div(int n1,int n2){

float ans;

ans=(float)n1/n2;

cout<<"Division Of "<<n1<<" And "<<n2<<" is = "<<ans<<endl;

cout<<endl<<endl;

}

int main(){

int choice,num1,num2;

bool temp=true;

while(temp){

cout<<"1. Addition "<<endl;

cout<<"2. Subtraction "<<endl;

cout<<"3. Multiplication "<<endl;

cout<<"4. Division "<<endl;

cout<<"5. Exit"<<endl;

cout<<endl;

cout<<"Enter Your choice= ";

cin>>choice;

switch(choice){

case 1:

cout<<endl;

cout<<"Enter The Number1= ";

cin>>num1;

cout<<"Enter The Number2= ";

cin>>num2;

add(num1,num2);

break;

case 2:

cout<<endl;

cout<<"Enter The Number1= ";

cin>>num1;

cout<<"Enter The Number2= ";

cin>>num2;

sub(num1,num2);

break;

case 3:

cout<<endl;

cout<<"Enter The Number1= ";

cin>>num1;

cout<<"Enter The Number2= ";

cin>>num2;

mul(num1,num2);

break;

case 4:

cout<<endl;

cout<<"Enter The Number1= ";

cin>>num1;

cout<<"Enter The Number2= ";

cin>>num2;

div(num1,num2);

break;

case 5:

temp=false;

break;

default:cout<<"Enter Valid Input"<<endl;

}

}

return 0;

}

-------------------------------------------------------------------------------------

🡪2. Factorial Calculation Using Recursion

o Write a C++ program that calculates the factorial of a number using recursion.

o **Objective**: Understand recursion in functions.

Ans.

#include<iostream>

using namespace std;

int factrial(int n){

if(n==0||n==1){

return 1;

}

else {

return n\*factrial(n-1);

}

}

int main(){

int num;

cout<<"Enter The number= ";

cin>>num;

int res=factrial(num);

cout<<"factorial of "<<num<<" is = "<<res;

}

------------------------------------------------------------------------------------

🡪3. Variable Scope

o Write a program that demonstrates the difference between local and global variables in C++. Use functions to show scope.

o **Objective**: Reinforce the concept of variable scope.

Ans.

#include<iostream>

#include<string>

using namespace std;

int num=1000;//global scope or global variable

int inc\_10()

{

num+=200;

return 0;

}

int main()

{

cout<<"Before change in number "<<num<<endl;

inc\_10();

cout<<"After change in number "<<num<<endl;

}

-------------------------------------------------------------------------------------

* **Array And String:**-

🡪1. Array Sum and Average

o Write a C++ program that accepts an array of integers, calculates the sum and average, and displays the results.

o **Objective**: Understand basic array manipulation.

**Ans**.

#include<iostream>

using namespace std;

int main(){

int size,i,sum=0;

float average;

cout<<"Enter the size of array= ";

cin>>size;

int array[size];

for(i=0;i<size;i++){

cout<<"Enter the element in array["<<i<<"] is = ";

cin>>array[i];

}

for(i=0;i<size;i++){

cout<<"Array a["<<i<<"] is = "<<array[i]<<endl;

sum=sum+array[i];

}

cout<<"Sum of array element is= "<<sum<<endl;

cout<<"Average of Array Ellement is = "<<sum/size;

return 0;

}

------------------------------------------------------------------------------------

🡪2. Matrix Addition

o Write a C++ program to perform matrix addition on two 2x2 matrices.

o **Objective**: Practice multi-dimensional arrays.

Ans.

#include<iostream>

using namespace std;

int main(){

int row,col,i,j;

cout<<"Enter the Row= ";

cin>>row;

cout<<"Enter the Col= ";

cin>>col;

int arr1[row][col],arr2[row][col],add[row][col];

cout<<"Enter Element in Arr1= "<<endl;

for(i=0;i<row;i++){

for(j=0;j<col;j++){

cout<<"Enter the Arr1["<<i<<"]["<<j<<"]= ";

cin>>arr1[i][j];

}

}

cout<<"Enter Element in Arr2= "<<endl;

for(i=0;i<row;i++){

for(j=0;j<col;j++){

cout<<"Enter the Arr2["<<i<<"]["<<j<<"]= ";

cin>>arr2[i][j];

}

}

for(i=0;i<row;i++){

for(j=0;j<col;j++){

add[i][j]=arr1[i][j]+arr2[i][j];

}

}

cout<<"Array 1= "<<endl;

for(i=0;i<row;i++){

for(j=0;j<col;j++){

cout<<arr1[i][j]<<" ";

}

cout<<endl;

}

cout<<"Array 2= "<<endl;

for(i=0;i<row;i++){

for(j=0;j<col;j++){

cout<<arr2[i][j]<<" ";

}

cout<<endl;

}

cout<<"Addition = "<<endl;

for(i=0;i<row;i++){

for(j=0;j<col;j++){

cout<<add[i][j]<<" ";

}

cout<<endl;

}

return 0;

}

------------------------------------------------------------------------------------

🡪3. String Palindrome Check

o Write a C++ program to check if a given string is a palindrome (reads the same forwards and backwards).

o Objective: Practice string operations

Ans.

#include<iostream>

#include<string>

using namespace std;

int main(){

string str,reverse;

cout<<"Enter The string= ";

cin>>str;

int i;

for(i=str.length()-1;i>=0;i--){

reverse+=str[i];

}

if(str==reverse)

{

cout<<"this string is Palindrome string."<<endl;

}

else{

cout<<"this string is not a Palindrome string."<<endl;

}

return 0;

}

-------------------------------------------------------------------------------------

* **Introduction to Object-Oriented Programming**

🡪1. Class for a Simple Calculator

o Write a C++ program that defines a class Calculator with functions for addition, subtraction, multiplication, and division. Create objects to use these functions.

o Objective: Introduce basic class structure.

**Ans**.

#include<iostream>

using namespace std;

int num1,num2;

class calculator{

public:

void add(){

cout<<"enter Num1 and num2= ";

cin>>num1>>num2;

cout<<"Addition is= "<<num1+num2<<endl;

}

void sub(){

cout<<"enter Num1 and num2= ";

cin>>num1>>num2;

cout<<"Subtraction is= "<<num1-num2<<endl;

}

void mul(){

cout<<"enter Num1 and num2= ";

cin>>num1>>num2;

cout<<"Multiplication is= "<<num1\*num2<<endl;

}

void div(){

float ans;

cout<<"enter Num1 and num2= ";

cin>>num1>>num2;

ans=(float)num1/num2;

cout<<"division is= "<<ans<<endl;

}

};

int main(){

int ch;

while(ch!=5){

cout<<"1. Addition "<<endl;

cout<<"2. Subtraction "<<endl;

cout<<"3. Multiplication "<<endl;

cout<<"4. Division "<<endl;

cout<<"5. Exit"<<endl;

cout<<endl;

cout<<"Enter Your choice ";

cin>>ch;

calculator objcal;

switch(ch){

case 1:

objcal.add();

break;

case 2:

objcal.sub();

break;

case 3:

objcal.mul();

break;

case 4:

objcal.div();

break;

case 5:

break;

default:

cout<<"Enter valid choice= "<<endl;

}

}

//objcal.add();

// objcal.sub();

// objcal.div();

// objcal.mul();

return 0;

}

-------------------------------------------------------------------------------------

🡪2. Class for Bank Account

o Create a class BankAccount with data members like balance and member functions like deposit and withdraw. Implement encapsulation by keeping the data members private.

o **Objective**: Understand encapsulation in classes.

**Ans**.

#include<iostream>

using namespace std;

int ch;

class BankAccout{

private:

float balance=1000;

public:

/\*void setbalance(float bal){

balance=bal;

}\*/

void setdepo(float bal){

balance=balance+bal;

cout<<"Deposit money successfull"<<endl;

cout<<"Current balance is = "<<getbalance()<<endl;

}

void setwith(float bal){

balance=balance-bal;

cout<<"Withdraw money successfull"<<endl;

cout<<"Current balance is = "<<getbalance()<<endl;

}

float getbalance(){

return balance;

}

//void withdraw(){

//}

//void balancecheck(){

//getbalance();

//}

};

int main(){

BankAccout obj;

while(ch!=4){

cout<<"1. Balance check "<<endl;

cout<<"2. Deposit Money "<<endl;

cout<<"3. Withraw Money "<<endl;

cout<<"4. Exit "<<endl;

cout<<endl;

cout<<"Enter Your Choice = "<<endl;

cin>>ch;

switch(ch){

case 1:

cout<<"Available Balance is= "<<obj.getbalance()<<endl;

break;

case 2:

float dep;

cout<<"enter deposit amount= ";

cin>>dep;

obj.setdepo(dep);

break;

case 3:

float with;

cout<<"Enter Withdraw Amount= ";

cin>>with;

if(with<obj.getbalance()){

obj.setwith(with);}

else{

cout<<"insufficient balance,please check balance first "<<endl;

}

break;

case 4:

break;

default:

cout<<"Enter Valid input "<<endl;

}

}

return 0;

}

-------------------------------------------------------------------------------------

🡪3. Inheritance Example

o Write a program that implements inheritance using a base class Person and derived classes Student and Teacher. Demonstrate reusability through inheritance.

o **Objective**: Learn the concept of inheritance.

**Ans**.

#include<iostream>

#include<string>

using namespace std;

string name1;

string department;

string subject;

class Person{

public:

void name(){

cout<<"Enter Name= ";

getline(cin,name1);

}

void depart(){

cout<<"Enter Department Name= ";

getline(cin,department);

}

void sub(){

cout<<"Enter Subject Name= ";

getline(cin,subject);

}

};

class Student:public Person{

public:

void display(){

cout<<"student name is = "<<name1<<endl;

cout<<"student department is= "<<department<<endl;

cout<<"Student Subject is ="<<subject<<endl;

}

};

class Teacher:public Person{

public:

void display(){

cout<<"Teacher name is = "<<name1<<endl;

cout<<"Teacher department is= "<<department<<endl;

cout<<"Teacher Subject is ="<<subject<<endl;

}

};

int main(){

cout<<"Student Information section "<<endl;

Student obj1;

obj1.name();

obj1.depart();

obj1.sub();

obj1.display();

cout<<"Teacher Information section "<<endl;

Teacher obj2;

obj2.name();

obj2.depart();

obj2.sub();

obj2.display();

return 0;

}