



Graphic Era
HILL UNIVERSITY

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Term work

on
OOPs with C++
(PCS 307)

2021-22

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

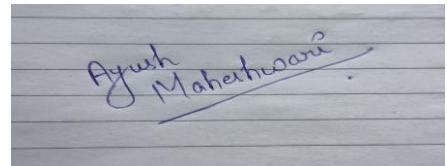
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ACKNOWLEDGMENT

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At last but not the least I greatly indebted to all other persons who directly or indirectly helped me during this course.

Ayush Maheshwari



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GEHU, Dehradun



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7	<p>Write C++ code for below mentioned tasks?</p> <p>Array and 2D Array related Questions in C++:</p> <p>Task1: Create a switch statement [Manual], In Which:</p> <ul style="list-style-type: none"> a. When you pass 1 your program would print current year b. When you pass 2 your program would print current month c. When you pass 3 your program would print current day d. When you pass 4 your program would print Not applicable <p>Task2: Create a switch statement [Using ctime], In Which:</p> <ul style="list-style-type: none"> a. When you pass 1 your program would print current year b. When you pass 2 your program would print current month c. When you pass 3 your program would print current day d. When you pass 4 your program would print Not applicable <p>Task3:</p> <p>v1. Print using reverse method:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1 2 3</td><td style="width: 50%;">9 8 7</td></tr> <tr> <td>4 5 6</td><td>==> 6 5 4</td></tr> <tr> <td>7 8 9</td><td>3 2 1</td></tr> </table> <p>v2. Print using (10- arr[i][j]) method:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1 2 3</td><td style="width: 50%;">9 8 7</td></tr> <tr> <td>4 5 6</td><td>==> 6 5 4</td></tr> <tr> <td>7 8 9</td><td>3 2 1</td></tr> </table> <p>v3. Restore using reverse method [without creating new array]:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1 2 3</td><td style="width: 50%;">9 8 7</td></tr> <tr> <td>4 5 6</td><td>==> 6 5 4</td></tr> <tr> <td>7 8 9</td><td>3 2 1</td></tr> </table> <p>v4. Restore using (10- arr[i][j]) method [without creating new array]:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1 2 3</td><td style="width: 50%;">9 8 7</td></tr> <tr> <td>4 5 6</td><td>==> 6 5 4</td></tr> <tr> <td>7 8 9</td><td>3 2 1</td></tr> </table> <p>Task4: Restore the same values in the same array, arr[3][3]:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1 2 3</td><td style="width: 50%;">1 1 1</td></tr> <tr> <td>4 5 6</td><td>==> 2 2 2</td></tr> </table>	1 2 3	9 8 7	4 5 6	==> 6 5 4	7 8 9	3 2 1	1 2 3	9 8 7	4 5 6	==> 6 5 4	7 8 9	3 2 1	1 2 3	9 8 7	4 5 6	==> 6 5 4	7 8 9	3 2 1	1 2 3	9 8 7	4 5 6	==> 6 5 4	7 8 9	3 2 1	1 2 3	1 1 1	4 5 6	==> 2 2 2	49-76
1 2 3	9 8 7																													
4 5 6	==> 6 5 4																													
7 8 9	3 2 1																													
1 2 3	9 8 7																													
4 5 6	==> 6 5 4																													
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1 2 3	1 1 1																													
4 5 6	==> 2 2 2																													

7 8 9 3 3 3

- v1. Use row loop [int i, for all j]
- v2. Use arr[i][N-1]/3, at each place
- v3. Use, arr[i][j]-(2*i+j)

Task5: Store these in an array[4][4] in given fassion and then print:

*
* *
* * *
* * * *

Task6: Store these in an array[4][4] in given fashion and then print:

* * * *
* * *
* *
*

Task7: Store these in an array[4][4] in given fashion and then print:

*
* *
* * *
* * * *

Task8: Store these in an array[4][4] in given fashion and then print:

* * * *
* * *
* *
*

8

Write C++ code for below mentioned tasks?

77-98

Pointer, Function, Inline Function, Recursion in C++:

Task1: Will the program through an error and if yes then why?

```
int *p = {10,20,20};
```

```
cout << *p;
```

```
p++;
```

```
cout << *p;
```

Task2: Output of this program?

V1. Issue?

```
int arr[] = {10,20,30};  
cout << *arr;  
cout << arr;  
arr++;  
cout << *arr;
```

V2. How to resolve above issue?

```
int arr[] = {10,20,30};  
cout << *arr;  
cout << arr;  
cout << *(?);
```

Task3: Output of this program?**V1.** Output?

```
int a = 10;  
int *p;  
int **q;  
p = &a;  
q = &p;  
cou << *p;  
cou << **q;
```

V2. Change the value of a using q pointer to pointer.**Task4:** Find factorial of a number using function but not recursion**Task5:** Find factorial of a number using recursion**Task6:** Series Problem using recursion for n series

2, (2^2 + 2), (3^3 + 3), (4^4 + 4), (5^5 + 5),

Hint:

 $n * ((n-1)^(n-1) + (n-1))$ **Task7:** Perform Call by value, call by Address for swapping value of a and b:

```
int a = 10;  
int b = 20;
```

V1. Swap(a,b); //call by Value [void swap(int a, int b){}]**V2.** Swap(a,b); //call by Value [void swap(int &a, int &b){}]**V3.** Swap(&a,&b); //call by Address

9	<p>Write C++ code for below mentioned tasks?</p> <p>Class, Object, Constructor, Static Data Members, friend function in C++:</p> <p>Task1: Class and Object in C++</p> <p>a. WAP to assign and print the roll number, phone number and address of two students having names "Sam" and "John" respectively by creating two objects of the class 'Student'.</p> <p>b. WAP which would contain array of objects [many objects], of a class Student. Student [Name, Age, Year, section, marks], the section would be A,B,C and D. Your program would be able to return the total marks of students in the college.</p> <p>Hint [Make a Matrix or Tabular diagram to understand the problem], all the rows will differ each other by different objects of Student class [Student s1,s2,s3,s4].</p> <p>Task2: Constructor in C++</p> <p>WAP to create a class to print the area of a square and a rectangle. The class has two functions with the same name but different number of parameters. The function for printing the area of rectangle has two parameters which are its length and breadth respectively while the other function for printing the area of square has one parameter which is the side of the square. Use multiple constructors to for the initialization.</p> <p>Task3: Static Data Members in C++</p> <p>WAP to count the total number of calls for a member function from more than one objects. [Lets say, from 3 such Objects]</p> <p>Task4: Friend Function in C++</p> <p>WAP in which you create a Student class having basic information for each student, like name, age and marks. By using friend function add marks of all the students [lets say 3 objects] and print it.</p> <p>Task5: Structure in C++</p> <p>WAP to create a College class and Student Structure in C++ in one program. By providing such suitable examples write at least 5 differences between class and struct code your have written above.</p> <p>Hint [Access Specifiers, Heap and Stack, large and small memory, etc.]</p> <p>Task6: Extra Questions:</p> <p>WAP which would perform these tasks of your data:</p> <ul style="list-style-type: none"> a. Come to next line b. set minimum field width c. fill string with (*) after setw(15) function *****1234 <p>by using endl, setw, and setfill [Manipulators in C++]</p>	99-113
10	<p>Write C++ code for below mentioned tasks?</p> <p>Array of Objects, Pointer to Object, This pointer, Operator Overloading in C++</p> <p>Task1: Array of Objects in C++</p> <p>WAP to create a directory that contains the following information.</p> <ul style="list-style-type: none"> (a) Name of a person (b) Address 	114-126

	<p>(c) Telephone Number (if available with STD code) (d) Mobile Number (if available) (e) Head of the family</p> <p>Task2: Pointer to Object in C++ WAP to create print or display Student information containing in Student class by using pointers to object.</p> <p>Task3: This pointer in C++ WAP to pass two variables in a parameterized constructor during object creation and have same names variables as class member data and constructor parameters. Your job is to calculate the remainder of those two numbers.</p> <p>Task4: Operator Overloading in C++ a). WAP, in which you write a friend function to overload a less than '<' operator in C++. b). WAP in which you can add two objects [every object would have 1 integer value] by overloading + operator, which eventually would add the data values of those two object by adding the objects.</p>	
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11	<p>Write C++ code for below mentioned tasks?</p> <p>Task-11.1 Inheritance Basics: WAP in C++ to create a Parent and Child interaction using inheritance. With this Parent and Child Interaction try to perform these tasks:</p> <ul style="list-style-type: none"> a. Call Parent class method in child class function without creating an object of parent class b. Call Parent class method in main method by child class object <p>Task-11.2 Multiple Inheritance in C++: Create two classes named Mammals and MarineAnimals. Create another class named BlueWhale which inherits both the above classes. Now, create a function in each of these classes which prints “I am mammal”, “I am a marine animal” and “I belong to both the categories: Mammals as well as Marine Animals” respectively. Now, create an object for each of the above class and try calling</p> <p>1 – function of Mammals by the object of Mammal 2 – function of MarineAnimal by the object of MarineAnimal 3 – function of BlueWhale by the object of BlueWhale 4 – function of each of its parent by the object of BlueWhale</p> <p>Task-11.3 Dimond Problem in multiple inheritance using C++:</p> <ul style="list-style-type: none"> a. WAP to illustrate Dimond Problem in multiple inheritance b. its solution using Virtual base classes. Write separate programs if required. c. What else multiple inheritance can cause in a program, explain it by providing proper solution 	127-137
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12	<p>Write C++ code for below mentioned tasks?</p> <p>Task-12.1 WAP to illustrate the role of Access Modifiers [private, public, protected] separately in:</p> <ul style="list-style-type: none"> a. Accessing base class elements in derived class or Inheritance b. Accessing base class elements through object <p>Task-12.2 Execution flow of Constructors and Destructors in C++:</p> <ul style="list-style-type: none"> a. WAP to illustrate the calling and execution flow of Constructors in inheritance. [L-2 Inheritance] b. WAP to illustrate the calling and execution flow of Destructors in inheritance. [L-2 Inheritance] c. Pass parameters to base class through derived class constructor. [L-1 Inheritance] 	138-143
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13	<p>Write C++ code for below mentioned tasks?</p> <p>Task 13.1 To overload add method for two parameters with int and float data types in Base class. Along with it create a Derived class from the Base class named as child. The class child should override one of the overloaded method from base class.</p> <p>Perform following tasks:</p> <ol style="list-style-type: none"> 1. Try calling overriding method from child class object. 2. Write name of the method which is not seen by the child class object <p>Create two versions:</p> <p>version 01: without ‘using’ keyword version 02: with ‘using’ keyword</p> <p>Task 13.2 Base class having a virtual and a pure virtual function. Derived class having same copy of virtual function with changed logic and definition of pure virtual function.</p> <p>Perform following tasks:</p> <ol style="list-style-type: none"> 1. Try to call child class overriding method from base class pointer. 2. Try to call child class definition of pure virtual function in child class. 3. Find out the abstraction in above implementation. 	144-156
14	<p>Write C++ code for below mentioned tasks?</p> <p>Task 14.1 Illustrate the compile time and run time binding using base class pointer, which holds the address of child class</p> <p>Task 14.2 Perform the following:</p> <ol style="list-style-type: none"> 1. Call base class destructor from base class pointer which is holding the child class object. 2. Call child class destructor from base class pointer which is holding the child class object. 	157-162
15	<p>Write C++ code for below mentioned tasks?</p> <p>Task 15.1 WAP in C++ to read and write from and to a file using ifstream and ofstream.</p> <p>Task 15.2 WAP in C++ to perform these tasks:</p> <ol style="list-style-type: none"> a. Read from a file using fstream [char by char] b. Write into a file using fstream c. Append into a file using fstream d. Count total number of characters, words and lines in a file <p>Task 15.3 WAP in C++ for IO manipulators mentioned below:</p> <ol style="list-style-type: none"> a. IOS: hex,dec,skipws,noskipws b. Istream: ws 	163-166

	<p>c. Ostream: endl, ends, flush d. Iomanip: setW, setPrecision</p>	
16	<p>Write C++ code for below mentioned tasks?</p> <p>Task 16.1 WAP in C++ to create a generic add function for given tasks:</p> <ul style="list-style-type: none"> a. Perform add over two integers and return integer b. Perform add over one int and one float and return double <p>Task 16.2 WAP in C++ to perform these tasks:</p> <ul style="list-style-type: none"> a. Catch a Divide by zero exception in $z = x/y$ using “throw runtime_error” b. What will be the output of this program and why? <pre>#include <iostream> using namespace std; int main() { try { throw 'a'; } catch (int x) { cout << "Caught " << x; } catch (...) { cout << "Default Exception\n"; } return 0; }</pre> <p>c. What will be the output of this program and why?</p> <pre>#include <iostream> using namespace std; int main() { try { throw 'a'; } catch (int x) { cout << "Caught "; } return 0; }</pre> <p>d. Rethrow and catch an exception by creating a separate user defined divide function for condition divide by zero.</p>	167-178

17	<p>WAP in C++ with the help of STL:</p> <p>a. List:</p> <ol style="list-style-type: none"> 1. Iterate a int list using iterator and print it 2. Find size of a list 3. Sort a list 4. Reverse a list <p>b. Vector:</p> <ol style="list-style-type: none"> 1. Insert elements into a int vector 2. Iterate this vector using iterator and print it 3. Find size of a capacity and max size of a vector 4. Resize a vector 5. checks if the vector is empty or not <p>c. Map:</p> <ol style="list-style-type: none"> 1. Insert elements into a <int, string> map 2. insert elements in random order 3. Iterate this map using iterator and print its keys and values 4. Find an element as key from this map 5. assigning the elements from map1 to map2 6. remove all elements with key = x (any key present in map) 7. Find size, max size of a map 8. checks if this map is empty or not 9. Clear a map <p>d. Algorithm:</p> <ol style="list-style-type: none"> 1. Covert an Array into a Vector 2. Sort a Vector 3. Reverse a vector 4. Max element in a Vector 5. Min element in a Vector 6. Occurrences of x in a vector 7. Sort an Array 8. Binary Search in an Array 	179-189
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DEPARTMENT OF CSE

B.Tech. CSE

STUDENT LAB REPORT SHEET

Name of Student Mob.No.....

Photograph
Passport Size

Address Permanent

Father's Name Occupation MoNo.....

Mother's Name Occupation..... MoNo.....

Section Branch..... Semester..... Class Roll No..... Grade A B C

Local Address..... Email..... Marks 5 3 1

S.No.	Practical	D.O.P.	Date of Submission	Grade (Viva)	Grade (Report File)	Total Marks (out of 10)	Student's Signature	Teacher's Signature
1	Practical-01	23/09/2021	23/09/2021				AYUSH	
2	Practical-02	23/09/2021	23/09/2021				AYUSH	
3	Practical-03	02/10/2021	02/10/2021				AYUSH	
4	Practical-04	02/10/2021	02/10/2021				AYUSH	
5	Practical-05	07/10/2021	07/10/2021				AYUSH	
6	Practical-06	07/10/2021	07/10/2021				AYUSH	
7	Practical-07	17/10/2021	17/10/2021				AYUSH	
8	Practical-08	21/10/2021	21/10/2021				AYUSH	
9	Practical-09	28/10/2021	28/10/2021				AYUSH	
10	Practical-10	28/10/2021	28/10/2021				AYUSH	
11	Practical-11	02/11/2021	02/11/2021				AYUSH	
12	Practical-12	09/11/2021	09/11/2021				AYUSH	
13	Practical-13	16/11/2021	16/11/2021				AYUSH	

14	Practical-14	30/11/2021	30/11/2021				AYUSH	
15	Practical-15	07/12/2021	07/12/2021				AYUSH	
16	Practical-16	14/12/2021	14/12/2021				AYUSH	
17	Practical-17	21/12/2021	21/12/2021				AYUSH	

Practical No. 01

Q. Run all four compilation units individually for any sample program using C++.

Source Code :

```
#include<iostream>
#define max 100;
using namespace std;
int main()
{
    cout<<"HELLO WORLD" <<max;
}
```

Output

1. After Preprocessing :

```

student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder
    return npos;
}

template<typename _CharT, typename _Traits, typename _Alloc>
int
basic_string<_CharT, _Traits, _Alloc>::
compare(size_type __pos, size_type __n, const basic_string& __str) const
{
    _M_check(__pos, "basic_string::compare");
    __n = __M_limit(__pos, __n);
    const size_type __osize = __str.size();
    const size_type __len = std::min(__n, __osize);
    int __r = traits_type::compare(_M_data() + __pos, __str.data(), __len);
    if (!__r)
        __r = __S.compare(__n, __osize);
    return __r;
}

template<typename _CharT, typename _Traits, typename _Alloc>
int
basic_string<_CharT, _Traits, _Alloc>::
compare(size_type __pos1, size_type __n1, const basic_string& __str,
        size_type __pos2, size_type __n2) const
{
    _M_check(__pos1, "basic_string::compare");
    __str._M_check(__pos2, "basic_string::compare");
    __n1 = __M_limit(__pos1, __n1);
    __n2 = __str._M_limit(__pos2, __n2);
    const size_type __len = std::min(__n1, __n2);
    int __r = traits_type::compare(_M_data() + __pos1,
                                  __str.data() + __pos2, __len);
    if (!__r)
        __r = __S.compare(__n1, __n2);
    return __r;
}

template<typename _CharT, typename _Traits, typename _Alloc>
int
basic_string<_CharT, _Traits, _Alloc>::
compare(const _CharT* __s) const
{
    ;
    const size_type __size = this->size();
}

```

```

student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder
isalpha(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).is(ctype_base::alpha, __c); }

template<typename _CharT>
inline bool
isdigit(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).is(ctype_base::digit, __c); }

template<typename _CharT>
inline bool
ispunct(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).is(ctype_base::punct, __c); }

template<typename _CharT>
inline bool
isxdigit(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).is(ctype_base::xdigit, __c); }

template<typename _CharT>
inline bool
isalnum(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).is(ctype_base::alnum, __c); }

template<typename _CharT>
inline bool
isgraph(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).is(ctype_base::graph, __c); }
# 2637 "/usr/include/c++/5/bits/locale_facets.h" 3
template<typename _CharT>
inline _CharT
toupper(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).toupper(__c); }

template<typename _CharT>
inline _CharT
tolower(_CharT __c, const locale& __loc)
{ return use_facet<ctype<_CharT> >(__loc).tolower(__c); }

```

2. After Compiling :

```

.file  "prog1.cpp"
.local _ZStL8__ioinit
.comm _ZStL8__ioinit,1,1
.section .rodata
.LC0:
.string "HELLO WORLD"
.text
.globl main
.type main, @function
main:
.LFB1021:
.cfi_startproc
pushq %rbp
.cfi_def_cfa_offset 16
.cfi_offset 6, -16
movq %rsp, %rbp
.cfi_def_cfa_register 6
movl $.LC0, %esi
movl _$ZSt4cout, %edi
call _ZStlsISt11char_traitsIcEERSt13basic_ostreamIcT_ES5_PKc
movl $100, %esi
movq %rax, %rdi
call _ZNSolsEi
movl $0, %eax
popq %rbp
.cfi_def_cfa 7, 8
.cfi_endproc
.LFE1021:
.size main, .-main
.type _Z41__static_INITIALIZATION_and_destruction_0ii, @function
_Z41__static_INITIALIZATION_and_destruction_0ii:
.LFB1025:
.cfi_startproc
pushq %rbp
.cfi_def_cfa_offset 16
.cfi_offset 6, -16
movq %rsp, %rbp
.cfi_def_cfa_register 6
subq $16, %rsp
movl %edi, -4(%rbp)
movl %esi, -8(%rbp)
cmpl $1, -4(%rbp)

```

```

jne    .L5
cmpl  $65535, -8(%rbp)
jne    .L5
movl  $_ZStL8__ioinit, %edi
call   _ZNSt8ios_base4InitC1Ev
movl  $__dso_handle, %edx
movl  $_ZStL8__ioinit, %esi
movl  $_ZNSt8ios_base4InitD1Ev, %edi
call   __cxa_atexit
.L5:
nop
leave
.cfi_def_cfa 7, 8
ret
.cfi_endproc
.LFE1025:
.size  _Z41__static_INITIALIZATION_and_destruction_0ii, .-
_Z41__static_INITIALIZATION_and_destruction_0ii
.type   _GLOBAL__sub_I_main, @function
_GLOBAL__sub_I_main:
.LFB1026:
.cfi_startproc
pushq  %rbp
.cfi_def_cfa_offset 16
.cfi_offset 6, -16
movq  %rsp, %rbp
.cfi_def_cfa_register 6
movl  $65535, %esi
movl  $1, %edi
call   _Z41__static_INITIALIZATION_and_destruction_0ii
popq  %rbp
.cfi_def_cfa 7, 8
ret
.cfi_endproc
.LFE1026:
.size  _GLOBAL__sub_I_main, .-_GLOBAL__sub_I_main
.section      .init_array,"aw"
.align 8
.quad   _GLOBAL__sub_I_main
.hidden__dso_handle
.ident  "GCC: (Ubuntu 5.4.0-6ubuntu1~16.04.12) 5.4.0 20160609"
.section      .note.GNU-stack,"",@progbits

```

3. After Assembling :

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prog1.cpp ZStl8 ioinit Z41 static initialization and destruction 0ii
GLOBAL sub I main ZSt4cout
ZStlsISt11char traitsIcEERSt13basic ostreamIcT ES5 PKc ZNSolsEi
ZNSt8ios base4InitC1Ev dso handle ZNSt8ios base4InitD1Ev cxa atexit
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6ubuntu1~16.04.12) 5.4.0 20160609 .shstrtab .interp .note.ABI-tag .note.gnu.build-
id .gnu.hash .dynsym .dynstr .gnu.version .gnu.version_r .rela.dyn .rela.plt .init .plt.got .
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Practical No. 02

Q. Write an Efficient code to check if a number is prime or not.

Source Code :

```
#include<iostream>
#include <cmath>
using namespace std;
int main()
{
    int num, i, count = 1;
    cout << "Enter the number : ";
    cin >> num;
    for(i = 2; i <= sqrt(num); i++)
    {
        if(num % i == 0)
        {
            count = 0;
            break;
        }
    }
    if(count == 1)
    {
        cout << num << " is a prime number." << endl;
    }
    else
    {
        cout << num << " is not a prime number." << endl;
    }
    return 0;
}
```

Output

The screenshot shows a terminal window titled "student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/prime". The command "g++ ayush.cpp" is run, followed by "./a.out". The user enters "13" when prompted "Enter the number :". The output indicates that "13 is a prime number".

```
#include<iostream>
#include <cmath>
using namespace std;
int main()
{
    int num, i, count = 1;
    cout << "Enter the number : ";
    cin >> num;
    for(i = 2; i <= sqrt(num); i++)
    {
        if(num % i == 0)
        {
            count = 0;
            break;
        }
    }
    if(count == 1)
        cout << num << " is a prime number.\n";
    else
        cout << num << " is not a prime number.\n";
    return 0;
}
```

Practical No. 03

Q. Write C++ code for below mentioned tasks?

**Task1: How the preprocessor will react when you try to use,
#include<iostream.h> instead of #include<iostream>?**

Source Code :

```
#include<iostream.h>
using namespace std;
#define pi 3.14
int main()
{
    int area , r = 6;
    area = pi * r * r;
    cout<<"Area = "<<area;
}
```

Output

The screenshot shows a Linux desktop interface with a terminal window and two text editor windows.

Terminal Window:

```

knockcat@VICKY:~/Documents/OOPS in C++/Practical 3 - Preprocessor/Task - 1 (Without using Iostream Header File)
knockcat@VICKY:~/Documents/OOPS in C++/Practical 3 - Preprocessor/Task - 1 (Without using Iostream Header File)$ gedit task1.cpp
knockcat@VICKY:~/Documents/OOPS in C++/Practical 3 - Preprocessor/Task - 1 (Without using Iostream Header File)$ ls
task1.cpp
knockcat@VICKY:~/Documents/OOPS in C++/Practical 3 - Preprocessor/Task - 1 (Without using Iostream Header File)$ g++ -E task1.cpp
# 1 "task1.cpp"
# 1 "<built-in>"
# 1 "<command-line>" 1 3 4
# 1 "<command-line>" 2
# 1 "task1.cpp"
task1.cpp:3:9: fatal error: iostream.h: No such file or directory
   | #include <iostream.h>
               ^
compilation terminated.
knockcat@VICKY:~/Documents/OOPS in C++/Practical 3 - Preprocessor/Task - 1 (Without using Iostream Header File)$ gedit Conclusion.txt
knockcat@VICKY:~/Documents/OOPS in C++/Practical 3 - Preprocessor/Task - 1 (Without using Iostream Header File)$ 

```

Text Editor Windows:

- task1.cpp:** Contains C++ code to calculate the area of a circle using `#include<iostream.h>`.
- Conclusion.txt:** A text file containing the message: "If we include <iostream.h> in place of include<iostream> than the compiler will throw a fatal error that no such file or directory exist as #include<iostream.h>"

Q. Task2: How the preprocessor will react when you use cout but don't include #include<iostream> in your code?

Source Code :

```
using namespace std;
int main()
{
    cout<<"HELLO WORLD";
}
```

Output

The screenshot shows a desktop environment with a dark theme. A terminal window is open in the foreground, displaying the following command-line session:

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Ayush
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~ cd Desktop
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop$ cd Ayush
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Ayush$ g++ Practical2_Task1.cpp
Practical2_Task1.cpp:1:22: fatal error: iostream.h: No such file or directory
compilation terminated.
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Ayush$ |
```

Below the terminal, a code editor window titled "Practical2_Task2.cpp" is visible. It contains the following C++ code:

```
1 using namespace std;
2 int main()
3 {
4 cout<<"HELLO WORLD";
5 }
```

The code editor interface includes standard tools like a file menu ("Documents"), an "Open" button, and a "Save" button. The status bar at the bottom shows "C++" and "Tab Width: 1".

Task3: Take a char variable and use cin to take its value from the user, cout it and it will only return one character and loss rest of the data you have entered!

Source Code :

```
#include <iostream>
using namespace std;
int main()
{
    char a;
    cout << "Enter the value of a : ";
    cin>> a;
    cout << a<<endl;
}
```

Output

The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for a terminal, file manager, and other applications. The main window is a terminal window titled "student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Ayush". It displays the following command-line session:

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Ayush$ g++ xyz.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Ayush$ ./a.out
Enter the value of a : 4857
4
```

Below the terminal is a code editor window titled "xyz.cpp (~/.Desktop/Ayush) - gedit". The code is:

```
1 #include <iostream>
2 using namespace std;
3 int main()
4 {
5     char a;
6     cout << "Enter the value of a : ";
7     cin >> a;
8     cout << a << endl;
9 }
```

The status bar at the bottom of the code editor shows "C++" and "Tab Width: 1".

Task4: How to resolve above issue? [Hint: by using, getline(cin, line);]

Source Code :

```
#include<iostream>
#include<string>
using namespace std;

int main()
{
    string a;
    getline(cin,a);
    cout << a;
}
```

Output

The screenshot shows the Dev-C++ IDE interface. On the left, the code editor displays a file named 'ayush1.cpp' with the following content:

```

1 #include<iostream>
2 #include<string>
3 using namespace std;
4
5 int main()
6 {
7     string a;
8     getline(cin,a);
9     cout << a;
10 }
11
12

```

To the right of the code editor is a terminal window titled 'D:\VS Code\ayush1.exe' showing the output of the program:

```

Graphic Era Hill University
Graphic Era Hill University
-----
Process exited after 16.09 seconds with return value 0
Press any key to continue . .

```

At the bottom of the IDE, the status bar shows:

Line: 12 Col: 1 Sel: 0 Lines: 12 Length: 127 Insert Done parsing in 0.218 seconds

The taskbar at the bottom of the screen shows various application icons, including a search bar and system status indicators.

Practical No. 04

Q. Write C++ code for below mentioned tasks?

add(int,int), add(float, float), both of these methods are in two different namespaces First and Second respectively.

Task1: Access these methods using scope resolution operator [::](SRO) from main method?

Source Code :

```
#include <iostream>
using namespace std;
namespace first
{
    int add(int a , int b)
    {
        return (a+b);
    }
}
namespace second
{
    float add(float a , float b)
    {
        return (a+b);
    }
}
int main()
{
    cout <<"Sum is : " << first :: add(1,2)<<endl;
    cout <<"Sum is : " <<second :: add(1.2,2)<<endl;
    cout <<"Sum is : " <<second :: add(2,2.1)<<endl;
    cout <<"Sum is : " <<second :: add(1.1,2.3)<<endl;
    cout <<"Sum is : " <<first :: add(0,0)<<endl;
    return 0;
}
```

Output



```

*Task1.cpp (~/Desktop/Untitled Folder) - gedit
Documents Open Save
Task1.cpp

1 #include <iostream>
2 using namespace std;
3 namespace first
4 {
5 int add(int a, int b)
6 {
7     return (a+b);
8 }
9 }
10 namespace second
11 {
12 float add(float a, float b)
13 {
14     return (a+b);
15 }
16 }
17 int main()
18 {
19     cout << "Sum is : " << first :: add(1,2) << endl;
20     cout << "Sum is : " << second :: add(1.2,3) << endl;
21     cout << "Sum is : " << second :: add(2,3) << endl;
22     cout << "Sum is : " << second :: add(1,1,3) << endl;
23     cout << "Sum is : " << first :: add(0,0) << endl;
24     return 0;
25 }
26

```

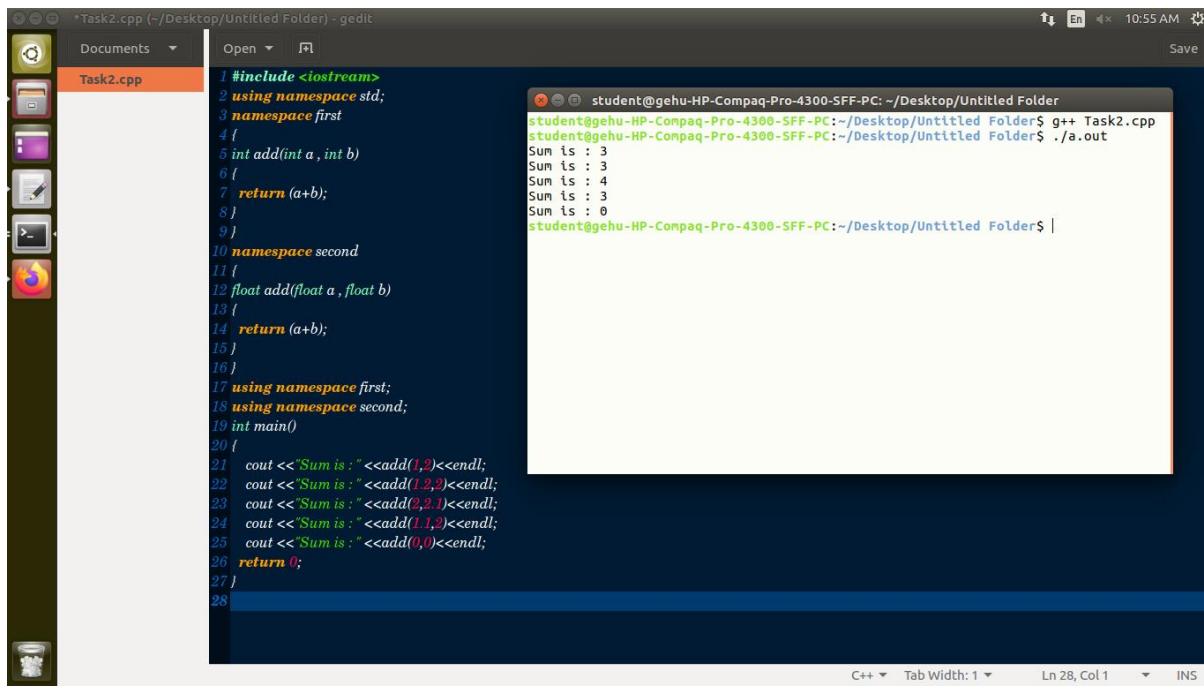
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder\$ g++ Task1.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder\$./a.out
Sum is : 3
Sum is : 3.2
Sum is : 4.1
Sum is : 3.4
Sum is : 0

Task2: Access these methods using "using" keyword for main method?

Source Code :

```
#include <iostream>
using namespace std;
namespace first
{
    int add(int a , int b)
    {
        return (a+b);
    }
}
namespace second
{
    float add(float a , float b)
    {
        return (a+b);
    }
}
using namespace first;
using namespace second;
int main()
{
    cout <<"Sum is : " <<add(1,2)<<endl;
    cout <<"Sum is : " <<add(1.2,2)<<endl;
    cout <<"Sum is : " <<add(2,2.1)<<endl;
    cout <<"Sum is : " <<add(1.1,2)<<endl;
    cout <<"Sum is : " <<add(0,0)<<endl;
    return 0;
}
```

Output



```
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ Task2.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
Sum is : 3
Sum is : 3
Sum is : 4
Sum is : 3
Sum is : 0
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ |
```

```
1 #include <iostream>
2 using namespace std;
3 namespace first
4 {
5     int add(int a, int b)
6     {
7         return (a+b);
8     }
9 }
10 namespace second
11 {
12     float add(float a, float b)
13     {
14         return (a+b);
15     }
16 }
17 using namespace first;
18 using namespace second;
19 int main()
20 {
21     cout << "Sum is :" << add(1,2) << endl;
22     cout << "Sum is :" << add(1.2,2) << endl;
23     cout << "Sum is :" << add(0.2,1) << endl;
24     cout << "Sum is :" << add(1.1,2) << endl;
25     cout << "Sum is :" << add(0,0) << endl;
26     return 0;
27 }
28
```

Task3: Try to access these methods without using, (SRO) and "using" keyword and check how the compiler will react to it?

Source Code :

```
#include <iostream>
using namespace std;
namespace first
{
    int add(int a , int b)
    {
        return (a+b);
    }
}

namespace second
{
    float add(float a , float b)
    {
        return (a+b);
    }
}

int main()
{
    cout <<"Sum is : " <<add(1,2)<<endl;
    cout <<"Sum is : " <<add(1.2,2)<<endl;
    cout <<"Sum is : " <<add(2,2.1)<<endl;
    cout <<"Sum is : " <<add(1.1,2.3)<<endl;
    cout <<"Sum is : " <<add(0,0)<<endl;
    return 0;
}
```

Output



The screenshot shows a terminal window with the following text:

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder
student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder$ g++ Task3.cpp
Task3.cpp: In function 'int main()':
Task3.cpp:19:33: error: 'add' was not declared in this scope
    cout <<"Sum is : " <<add(1,2)<<endl;
                                         ^
Task3.cpp:19:33: note: suggested alternatives:
Task3.cpp:5:5: note: 'first::add'
    int add(int a , int b)
               ^
Task3.cpp:12:7: note: 'second::add'
    float add(float a , float b)
               ^
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ |
```

The terminal window is titled "Task3.cpp (~/Desktop/Untitled Folder) - gedit". The code editor window is visible on the left, showing the source code for Task3.cpp. The code includes two namespaces, first and second, each containing an add function. The terminal shows a compilation error for the main function due to an undeclared 'add' symbol.

Task4: Try to access these methods for Mixed Values [Int, Float] and see how the compiler will react to it?

Source Code :

```
#include <iostream>
using namespace std;
namespace first
{
    int add(int a , int b)
    {
        return (a+b);
    }
}
namespace second
{
    float add(float a , float b)
    {
        return (a+b);
    }
}
using namespace first;
using namespace second;
int main()
{
    cout <<"Sum is : " <<add(1,2)<<endl;
    cout <<"Sum is : " <<add(1.2,2)<<endl;
    cout <<"Sum is : " <<add(2,2.1)<<endl;
    cout <<"Sum is : " <<add(1.1,2)<<endl;
    cout <<"Sum is : " <<add(0,0)<<endl;
    return 0;
}
```

Output

The screenshot shows a terminal window titled "student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder\$". The command "g++ Task2.cpp" is run, followed by "./a.out". The output displays five lines of text: "Sum is : 3", "Sum is : 3", "Sum is : 4", "Sum is : 3", and "Sum is : 0".

```
1 #include <iostream>
2 using namespace std;
3 namespace first
4 {
5 int add(int a, int b)
6 {
7     return (a+b);
8 }
9 }
10 namespace second
11 {
12 float add(float a, float b)
13 {
14     return (a+b);
15 }
16 }
17 using namespace first;
18 using namespace second;
19 int main()
20 {
21     cout << "Sum is :" << add(1,2) << endl;
22     cout << "Sum is :" << add(1.2,2) << endl;
23     cout << "Sum is :" << add(0.2,1) << endl;
24     cout << "Sum is :" << add(1.1,2) << endl;
25     cout << "Sum is :" << add(0,0) << endl;
26     return 0;
27 }
28
```

Practical No. 05

Q. Write C++ code for below mentioned tasks?

Primary Data Types related questions in C++:

Task1: Initialize all primary data types, assign their values and print them all? [char, bool, short, int, long, float, double, long double, wide char]

Source Code :

```
#include<iostream>

using namespace std;

void charFunction()

{
    char a = 'A';

    cout << "Char Value of a is : "<<a<< endl;

}

void boolFunction ()

{
    bool a = (20 > 17);

    cout <<"Bool Value of a is : "<< a<< endl;

}

void shortFunction()

{
    short a = 7;

    cout <<"Short Value of a is : "<< a<< endl;

}
```

```

void integerFunction()
{
    int a = 234;
    cout << "Integer Value of a is : "<< a<<endl;
}

void LongFunction()
{
    long a = 987654;
    cout << "Long Value of a is : "<< a<<endl;
}

void FloatFunction()
{
    float a = 2.2345f;
    cout << "Float Value of a is : "<< a<<endl;
}

void DoubleFunction()
{
    double a = 22.565765;
    cout << "Double Value of a is : "<<a<<endl;
}

void LongDoubleFunction()
{
    long double a = 43755.53656;
    cout << "Long Double of a is : "<< a<<endl;
}

```

```
void widecharFunction()

{
wchar_t a = L'~';

wcout <<"Wide Char Value of a is :"<< a<<endl;

}

int main()

{
charFunction();

boolFunction();

shortFunction();

integerFunction();

LongFunction();

FloatFunction();

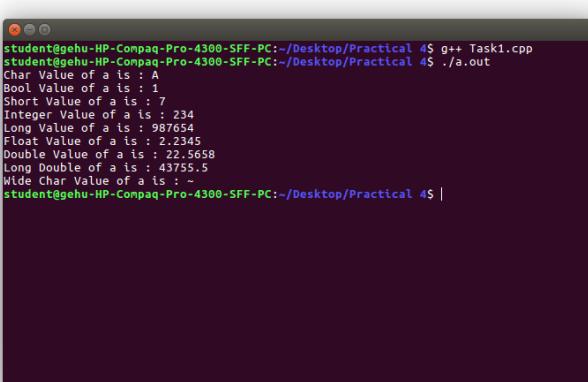
DoubleFunction();

LongDoubleFunction();

widecharFunction();

return 0;
}
```

Output



```

39 {
40     long double a = 43755.53656;
41     cout << "Long Double of a is :" << a << endl;
42 }
43 void widecharFunction()
44 {
45     wchar_t a = L'~';
46     wcout << "Wide Char Value of a is :" << a << endl;
47 }
48 int main()
49 {
50     charFunction();
51     boolFunction();
52     shortFunction();
53     integerFunction();
54     LongFunction();
55     FloatFunction();
56     DoubleFunction();
57     LongDoubleFunction();
58     widecharFunction();
59     return 0;
60 }
61
62
student@gehu-HP-Compaq-Pro-4300-SFF-PC:/Desktop/Practical 4$ g++ Task1.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:/Desktop/Practical 4$ ./a.out
Char Value of a is : A
Bool Value of a is : 1
Short Value of a is : 7
Integer Value of a is : 234
Long Value of a is : 987654
Float Value of a is : 2.2345
Double Value of a is : 22.5658
Long double of a is : 43755.5
Wide Char Value of a is : ~
student@gehu-HP-Compaq-Pro-4300-SFF-PC:/Desktop/Practical 4$ |

```

C++ Ln 1, col 2 Sel 1 (1) 1020 chars, 62 lines UNIX / OS X UTF-8 w/o BOM INS

Task2: Apply sizeof operator on all above operators and their variables?

Example

```
int a = 10;
cout << Sizeof(int);
cout << Sizeof(a);
```

Source Code :

```
#include<iostream>
using namespace std;
void charFunction()
{
char a = 'A';
cout << "Char Value of a is : "<<a<< endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Char Datatype is : "<<sizeof(char)<<endl;
cout<<endl;
}
void boolFunction ()
{
bool a = (20 >17);
cout <<"Bool Value of a is : "<< a<< endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Bool Datatype is : "<<sizeof(bool)<<endl;
cout<<endl;
}
void shortFunction()
{
short a = 7;
cout <<"Short Value of a is : "<< a<<endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Short Datatype is : "<<sizeof(short)<<endl;
cout<<endl;
}
void integerFunction()
{
int a = 234;
cout <<"Integer Value of a is : "<< a<<endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Int Datatype is : "<<sizeof(int)<<endl;
cout<<endl;
```

```

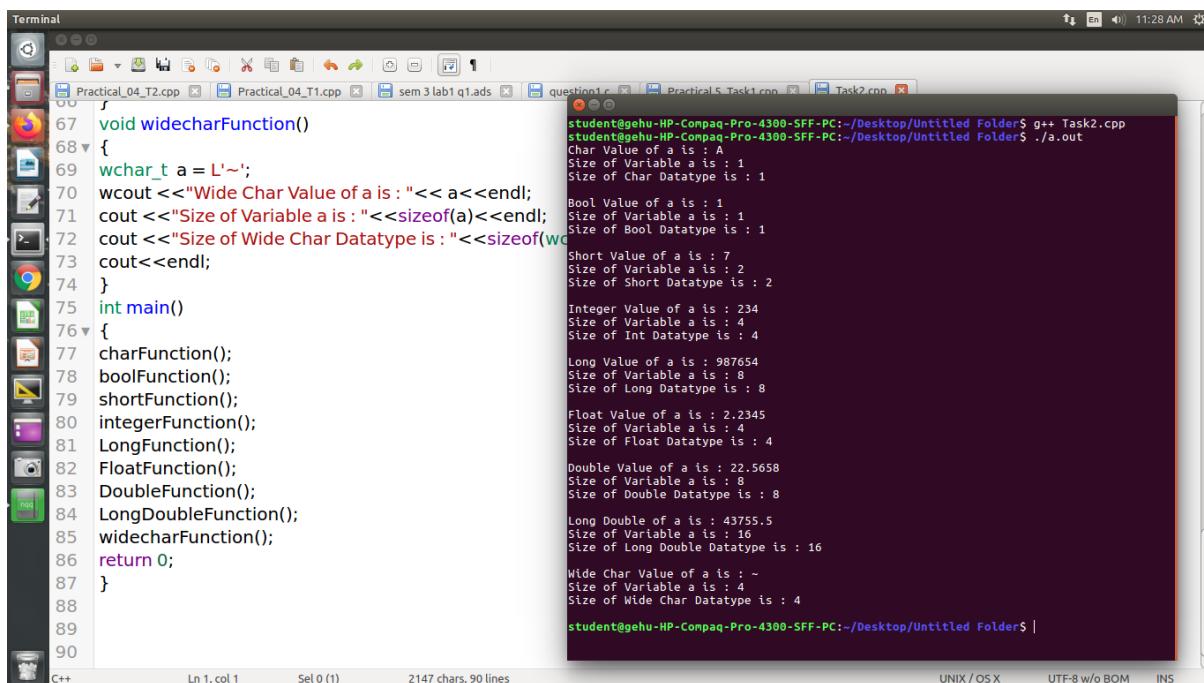
}

void LongFunction()
{
long a =987654;
cout <<"Long Value of a is : "<< a<<endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Long Datatype is : "<<sizeof(long)<<endl;
cout<<endl;
}
void FloatFunction()
{
float a = 2.2345f;
cout <<"Float Value of a is : "<< a<<endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Float Datatype is : "<<sizeof(float)<<endl;
cout<<endl;
}
void DoubleFunction()
{
double a = 22.565765;
cout <<"Double Value of a is : "<<a<<endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Double Datatype is : "<<sizeof(double)<<endl;
cout<<endl;
}
void LongDoubleFunction()
{
long double a = 43755.53656;
cout <<"Long Double of a is : "<< a<<endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Long Double Datatype is : "<<sizeof(long double)<<endl;
cout<<endl;
}
void widecharFunction()
{
wchar_t a = L'~';
wcout <<"Wide Char Value of a is : "<< a<<endl;
cout <<"Size of Variable a is : "<<sizeof(a)<<endl;
cout <<"Size of Wide Char Datatype is : "<<sizeof(wchar_t)<<endl;
cout<<endl;
}
int main()
{
charFunction();
}

```

```
boolFunction();
shortFunction();
integerFunction();
LongFunction();
FloatFunction();
DoubleFunction();
LongDoubleFunction();
widecharFunction();
return 0;
}
```

Output



```

student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ Task2.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
Char Value of a is : A
Size of Variable a is : 1
Size of char Datatype is : 1

Bool Value of a is : 1
Size of Variable a is : 1
Size of Bool Datatype is : 1

Short Value of a is : 7
Size of Variable a is : 2
Size of Short Datatype is : 2

Integer Value of a is : 234
Size of Variable a is : 4
Size of Int Datatype is : 4

Long Value of a is : 987654
Size of Variable a is : 8
Size of Long Datatype is : 8

Float Value of a is : 2.2345
Size of Variable a is : 4
Size of Float Datatype is : 4

Double Value of a is : 22.5658
Size of Variable a is : 8
Size of Double Datatype is : 8

Long Double of a is : 43755.5
Size of Variable a is : 16
Size of Long Double Datatype is : 16

Wide Char Value of a is : ~
Size of Variable a is : 4
Size of Wide Char Datatype is : 4

student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ |

```

The screenshot shows a terminal window with the title "Terminal". The window displays the output of a C++ program named "Task2.cpp". The program prints various data types and their sizes and values. The output includes:

- Char Value of a is : A
- Size of Variable a is : 1
- Size of char Datatype is : 1
- Bool Value of a is : 1
- Size of Variable a is : 1
- Size of Bool Datatype is : 1
- Short Value of a is : 7
- Size of Variable a is : 2
- Size of Short Datatype is : 2
- Integer Value of a is : 234
- Size of Variable a is : 4
- Size of Int Datatype is : 4
- Long Value of a is : 987654
- Size of Variable a is : 8
- Size of Long Datatype is : 8
- Float Value of a is : 2.2345
- Size of Variable a is : 4
- Size of Float Datatype is : 4
- Double Value of a is : 22.5658
- Size of Variable a is : 8
- Size of Double Datatype is : 8
- Long Double of a is : 43755.5
- Size of Variable a is : 16
- Size of Long Double Datatype is : 16
- Wide Char Value of a is : ~
- Size of Variable a is : 4
- Size of Wide Char Datatype is : 4

The terminal window also shows the command "g++ Task2.cpp" and "./a.out" being run at the prompt.

Practical No. 06

Q. Write C++ code for below mentioned tasks?

String related Questions in C++:

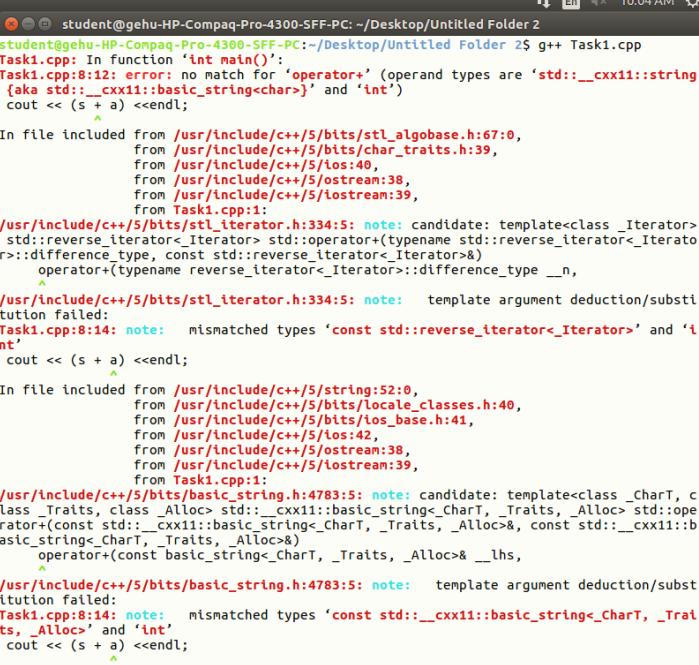
Task1: What happens if we add integer with a string, how the compiler would react to it?

```
String str = "ABC";
Int a = 1;
String str2 = str + a;
```

Source Code :

```
#include <iostream>
#include <string>
using namespace std;
int main()
{
    int a = 10;
    string s = "Hello World";
    cout << (s + a) << endl;
    return 0;
}
```

Output



```

Task1.cpp (-/Desktop/Untitled Folder 2) - edit
Documents Open F
Task1.cpp
1 #include <iostream>
2 #include <string>
3 using namespace std;
4 int main()
5 {
6     int a = 10;
7     string s = "Hello World";
8     cout << (s + a) << endl;
9     return 0;
10}
11
12
13

student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder 2$ g++ Task1.cpp
Task1.cpp:8:12: error: no match for 'operator+' (operand types are 'std::__cxx11::string' (aka std::__cxx11::basic_string<char>) and 'int')
    cout << (s + a) << endl;
               ^
In file included from /usr/include/c++/5/bits/stl_algobase.h:67:0,
                 from /usr/include/c++/5/bits/char_traits.h:39,
                 from /usr/include/c++/5/ios:40,
                 from /usr/include/c++/5/ostream:38,
                 from /usr/include/c++/5/iostream:39,
                 from Task1.cpp:1:
/usr/include/c++/5/bits/stl_iterator.h:334:5: note: candidate: template<class _Iterator>
std::reverse_iterator<_Iterator> std::operator+(typename std::reverse_iterator<_Iterator>::difference_type, const std::reverse_iterator<_Iterator>)
        operator+(typename reverse_iterator<_Iterator>::difference_type __n,
               ^
/usr/include/c++/5/bits/stl_iterator.h:334:5: note:   template argument deduction/substitution failed:
Task1.cpp:8:14: note: mismatched types 'const std::reverse_iterator<_Iterator>' and 'int'
    cout << (s + a) << endl;
               ^
In file included from /usr/include/c++/5/string:52:0,
                 from /usr/include/c++/5/bits/locale_classes.h:40,
                 from /usr/include/c++/5/bits/ios_base.h:41,
                 from /usr/include/c++/5/ios:42,
                 from /usr/include/c++/5/ostream:38,
                 from /usr/include/c++/5/iostream:39,
                 from Task1.cpp:1:
/usr/include/c++/5/bits/basic_string.h:4783:5: note: candidate: template<class _CharT, class _Traits, class _Alloc> std::__cxx11::basic_string<_CharT, _Traits, _Alloc> std::operator+(const std::__cxx11::basic_string<_CharT, _Traits, _Alloc> &, const std::__cxx11::basic_string<_CharT, _Traits, _Alloc> &)
        operator+(const basic_string<_CharT, _Traits, _Alloc> & __lhs,
               ^
/usr/include/c++/5/bits/basic_string.h:4783:5: note:   template argument deduction/substitution failed:
Task1.cpp:8:14: note: mismatched types 'const std::__cxx11::basic_string<_CharT, _Traits, _Alloc>' and 'int'
    cout << (s + a) << endl;
               ^

```

Task2: Check the entered string is Palindrome or not?

String str = "75457"

Output: Yes it is a palindrome or No it is not a Palindrome.

(Use, getline(cin, str1) and reverse_iterator of string to check this)

Source Code :

```
#include<bits/stdc++.h>
using namespace std;

int main()
{
    string s ;
    cout << "Enter a String " << endl;
    getline(cin,s);

    string t = s;

    reverse(t.begin(), t.end());

    if(s==t)
        cout << "String is a palindrome" << endl;
    else
        cout << "String is not a palindrome" << endl;

}
```

Output

The screenshot shows a terminal window with two tabs open: 'practical06_Task1.cpp' and 'practical06_Task2.cpp'. The code in Task1.cpp is a palindrome checker. The code in Task2.cpp is a simple string reversal program. The terminal output shows the execution of Task2.cpp followed by the execution of Task1.cpp with user input 'aassaa' and 'asdfaa'.

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    string s ;
    cout << "Enter a String " << endl;
    getline(cin,s);
    string t = s;
    reverse(t.begin(), t.end());
    if(s==t)
        cout << "String is a palindrome" << endl;
    else
        cout << "String is not a palindrome" << endl;
}
```

```
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ g++ practical06_Task1.cpp
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ ./a.out
Enter a String
aassaa
String is a palindrome
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ ./a.out
Enter a String
asdfaa
String is not a palindrome
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$
```

Task3: Make a reverse of a string using reverse method and reverse_iterator of string class?

Source Code :

```
#include<bits/stdc++.h>

using namespace std;

int main()
{
    string str , str1 ="";
    cout << "Enter a String " << endl;
    getline(cin,str);

    string str2 = str;

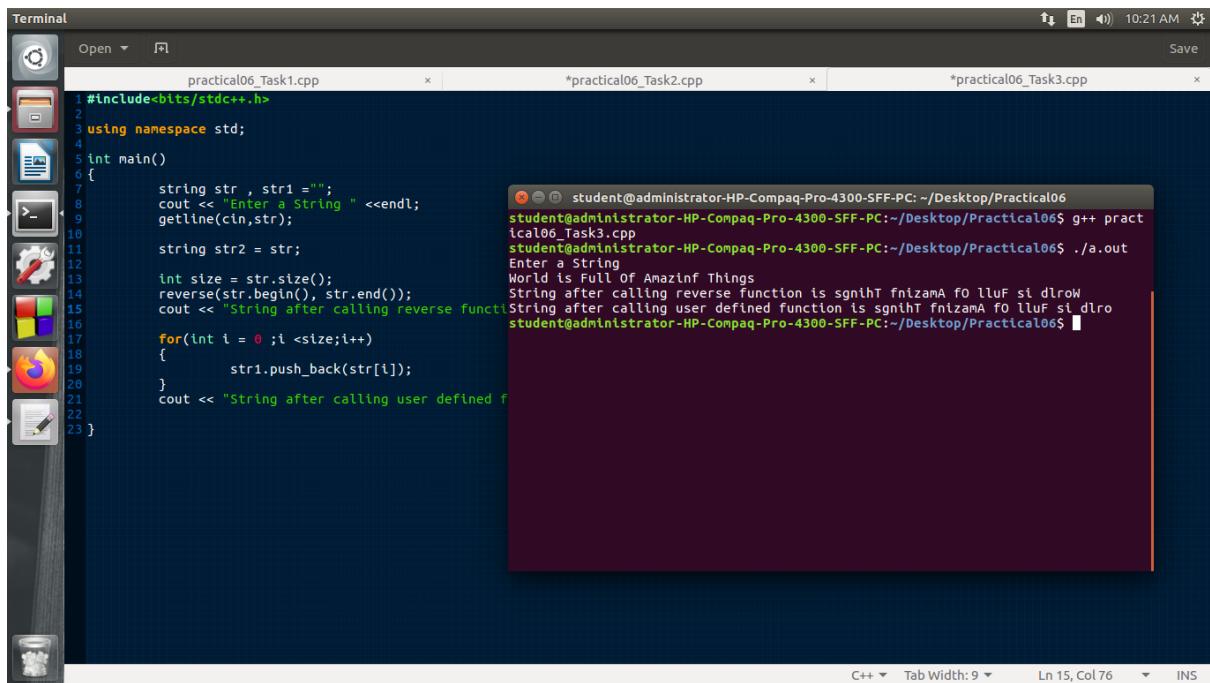
    int size = str.size();
    reverse(str.begin(), str.end());
    cout << "String after calling reverse function is "<< str << endl;
    int j =0;

    for(int i = 0 ;i <size-1;i++)
    {
        str1.push_back(str[i]);
    }

    cout << "String after calling user defined function is "<< str1 << endl;
}

}
```

Output



The screenshot shows a terminal window with three tabs open:

- practical06_Task1.cpp
- *practical06_Task2.cpp
- *practical06_Task3.cpp

The Task3.cpp tab is active and displays the following C++ code:

```

1 #include<bits/stdc++.h>
2
3 using namespace std;
4
5 int main()
6 {
7     string str , str1 = "";
8     cout << "Enter a String " << endl;
9     getline(cin,str);
10
11     string str2 = str;
12
13     int size = str.size();
14     reverse(str.begin(), str.end());
15     cout << "String after calling reverse function";
16
17     for(int i = 0 ;i <size;i++)
18     {
19         str1.push_back(str[i]);
20     }
21     cout << "String after calling user defined f
22
23 }

```

The terminal output shows the execution of the code and its results:

```

student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ g++ practical06_Task3.cpp
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ ./a.out
Enter a String
World is Full Of Amazing Things
String after calling reverse function is gnithT fnizamA fo lluF si dlrow
String after calling user defined function is sgnihT fnizamA fo lluF si dlro
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ 

```

Task4: String Compare: Check if the strings are equal or not? (do not use str1.compare(str2), do it manually)

Source Code :

```
#include<bits/stdc++.h>

using namespace std;

int main(){

    string str , str1;

    cout << "Enter first String " << endl;
    getline(cin,str);

    cout << "Enter second String " << endl;
    getline(cin,str1);

    if(str.size()!=str1.size())

    {

        cout<< "Strings are not equal"<<endl;

        return 0;

    }

    else

    {

        for(int i=0; i< str.size();i++)

        {

            if(str[i]!= str1[i])

                cout<< "Strings are not equal"<<endl;

            return 0;

        }

    }

}
```

```

    }

cout << "String are Equal" << endl;

}

}

```

Output

```

Terminal
Open ▾ Save
practical06_Task1.cpp x | practical06_Task2.cpp x | *practical06_Task3.cpp x | practical06_Task4.cpp x
1 #include<bits/stdc++.h>
2
3 using namespace std;
4
5 int main(){
6     string str , str1;
7     cout << "Enter first String " << endl;
8     getline(cin,str);
9     cout << "Enter second String " << endl;
10    getline(cin,str1);
11
12    if(str.size()!=str1.size())
13    {
14        cout<< "Strings are not equal" << endl;
15        return 0;
16    }
17    else
18    {
19        for(int i=0; i< str.size();i++)
20        {
21
22            if(str[i]!= str1[i]){
23                cout<< "Strings are not equal" << endl;
24                return 0;
25            }
26        }
27        cout << "String are Equal" << endl;
28
29    }
30
31 }

```

```

student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~$ cd Desktop
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop$ cd Practical06
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ g++ practical06_Task4.cpp
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ ./a.out
Enter first String
Amazing
Enter second String
Amazing
String are Equal
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical06$ 

```

C++ Tab Width: 9 ▾ Ln 22, Col 44 ▾ INS

Task5: String Compare: Check the possible values string.compare() function will return?

(Create cases in which compare function would return below values)

**X>0
X<0
X==0
X = -4
X = 5
X = -2104040...**

Also check the ASCII difference between two characters?(use int type cast)

Source Code :

```
#include <bits/stdc++.h>

using namespace std;

int main()

{
    string str = "Hello";
    string str1 = "Hello";
    cout << "First string is : " << str << endl;
    cout << "Second string is : " << str1 << endl;
    cout << "The value of comparision of two string is : " << str.compare(str1) << endl;
}
```

Output

The screenshot shows a terminal window titled "student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder". The command "g++ task5.cpp" was run, followed by "./a.out". The output shows the strings "Hello" and "Hello" being compared, resulting in a value of 0.

```
#include <iostream>
using namespace std;
int main()
{
    string str = "Hello";
    string str1 = "Hello";
    cout << "First string is : " << str << endl;
    cout << "Second string is : " << str1 << endl;
    cout << "The value of comparision of two string is : " << str.compare(str1) << endl;
}
```

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ task5.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
First string is : Hello
Second string is : Hello
The value of comparision of two string is : 0
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ |
```

Task6: Check if string is mutable in C++ or not?

```
String a = "Hello";
Cout << &a;
a[0] = 'J';
Cout << &a;
Cout << a;
```

What is the output?

Source Code :

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    string str = "Hello";
    cout << "The address of str is : " << &str << endl;
    cout << "The value of str is : " << str << endl;
    str[0] = 'J';
    cout << "The address of str is : " << &str << endl;
    cout << "The value of str is : " << str << endl;
    return 0;
}
```

Output

The screenshot shows a terminal window running on a Linux system. The terminal command is:

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ task6.cpp  
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
```

The terminal output is:

```
The address of str is : 0x7ffcd5282800  
The value of str is : Hello  
The address of str is : 0x7ffcd5282800  
The value of str is : Jello
```

The code in the gedit editor is:

```
1 #include<bits/stdc++.h>  
2 using namespace std;  
3 int main()  
4 {  
5     string str = "Hello";  
6     cout << "The address of str is :" << &str << endl;  
7     cout << "The value of str is :" << str << endl;  
8     str[0] = 'J';  
9     cout << "The address of str is :" << &str << endl;  
10    cout << "The value of str is :" << str << endl;  
11    return 0;  
12 }  
13  
14  
15
```

Practical No. 07

Q. Write C++ code for below mentioned tasks?

Array and 2D Array related Questions in C++:

Task1: Create a switch statement [Manual], In Which:

- a. When you pass 1 your program would print current year
- b. When you pass 2 your program would print current month
- c. When you pass 3 your program would print current day
- d. When you pass 4 your program would print Not applicable

Source Code :

```
#include<iostream>
using namespace std;
int main()
{
    int n;
    cout <<"\n1. YEAR\n2. MONTH\n3. DAY\n4.EXIT\n" << endl;
    cout << "Enter the value of n : ";
    cin >> n;
    switch(n)
    {
        case 1:
            cout <<"2021" << endl;
            break;
        case 2:
            cout <<"October" << endl;
            break;
        case 3:
            cout <<"Wednesday" << endl;
            break;
        case 4:
            cout <<"Exiting the program!" << endl;
            break;
        default :
            cout <<"Not Applicable" << endl;
            break;
    }
}
```

Output

The image shows a Linux desktop environment with a terminal window and a file manager window.

Terminal Window:

```

1 //Print Year, Month, Day Manually by using switch statement.
2 #include<iostream>
3 using namespace std;
4 int main()
5 {
6     int n;
7     cout << "1. YEAR\n2. MONTH\n3. DAY\n4.EXIT\n" << endl;
8     cout << "Enter the value of n : ";
9     cin >> n;
10    switch(n)
11    {
12        case 1:
13            cout << "2021" << endl;
14            break;
15        case 2:
16            cout << "October" << endl;
17            break;
18        case 3:
19            cout << "Wednesday" << endl;
20            break;
21        case 4:
22            cout << "Exiting the program!" << endl;
23            break;
24        default:
25            cout << "Not Applicable" << endl;
}
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ t
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
1. YEAR
2. MONTH
3. DAY
4.EXIT
Enter the value of n : 1
2021
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
1. YEAR
2. MONTH
3. DAY
4.EXIT
Enter the value of n : 2
October
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
1. YEAR
2. MONTH
3. DAY
4.EXIT
Enter the value of n : 3
Wednesday
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
1. YEAR
2. MONTH
3. DAY
4.EXIT
Enter the value of n : 4
Exiting the program!

```

File Manager Window:

The file manager window shows a list of icons for various applications including Terminal, File Manager, Browser, and others.

Task2: Create a switch statement [Using ctime], In Which:

- a. When you pass 1 your program would print current year**
- b. When you pass 2 your program would print current month**
- c. When you pass 3 your program would print current day**
- d. When you pass 4 your program would print Not applicable**

Source Code :

```
#include <iostream>
#include <ctime>
using namespace std;

int main()
{
    time_t curtime;

    time(&curtime);
    int choice;
    cout << "1. Print current year." << endl;
    cout << "2. Print current month." << endl;
    cout << "3. Print current day." << endl;
    cout << "4. Print current Time." << endl;
    cout << "Enter your choice : ";
    cin >> choice;

    string day[7] = {"Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday",
"Saturday"};
    string month[12]={ "January","February","March","April","May","June","July","August",
"September","October","November","December"};

    time_t res = time(0);
    struct tm *t = localtime(&res);

    switch(choice)
    {
        case 1:   cout << "Current year is " << t->tm_year + 1900 << endl;
        break;

        case 2:   cout << "Current month is " << month[t->tm_mon] << endl;
    }
}
```

```
break;

case 3:
cout << "Current day is " << day[t->tm_wday] << endl;
break;

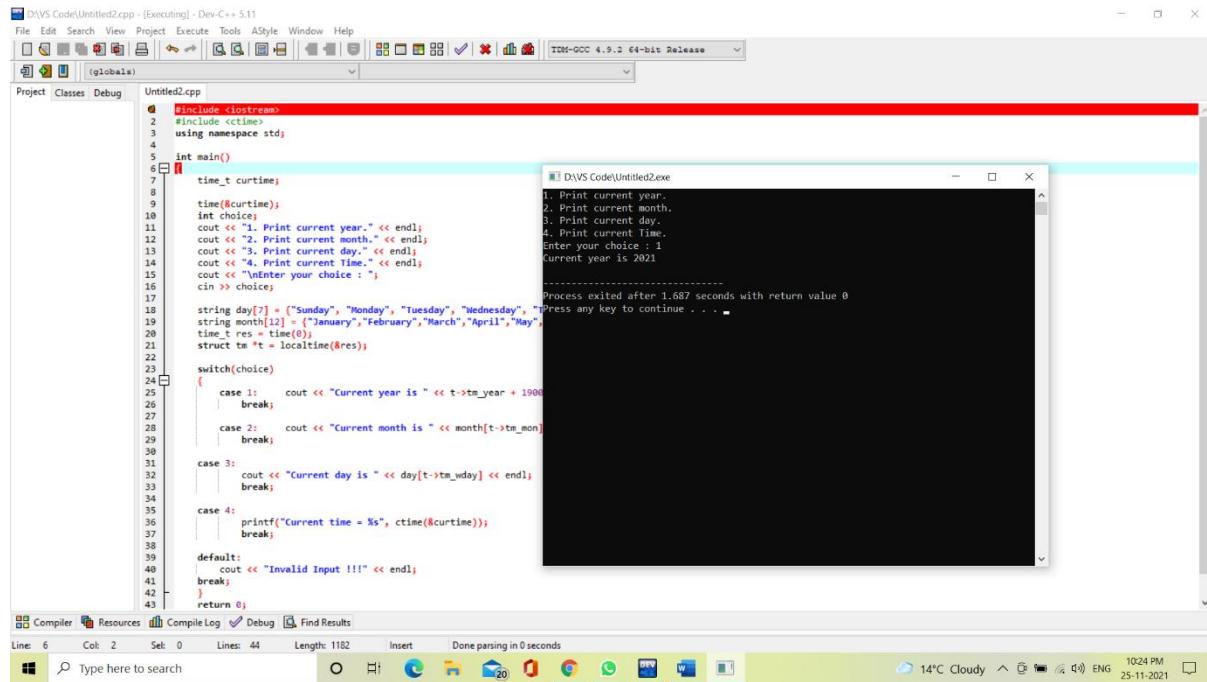
case 4:
printf("Current time = %s", ctime(&curtime));
break;

default: cout << "Invalid Input !!!" << endl;
break;
}

return 0;
}
```

Output

a). Current Year :



The screenshot shows the Dev-C++ IDE interface. The code in the editor is as follows:

```

1 #include <iostream>
2 #include <ctime>
3 using namespace std;
4
5 int main()
6 {
7     time_t curtime;
8     time(&curtime);
9     int choice;
10    cout << "1. Print current year." << endl;
11    cout << "2. Print current month." << endl;
12    cout << "3. Print current day." << endl;
13    cout << "4. Print current Time." << endl;
14    cout << "\nEnter your choice : ";
15    cin >> choice;
16
17    string day[7] = {"Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"};
18    string month[12] = {"January", "February", "March", "April", "May", "June", "July", "August", "September", "October", "November", "December"};
19
20    time_t res = time(0);
21    struct tm *t = localtime(&res);
22
23    switch(choice)
24    {
25        case 1: cout << "Current year is " << t->tm_year + 1900 << endl;
26        break;
27
28        case 2: cout << "Current month is " << month[t->tm_mon] << endl;
29        break;
30
31        case 3: cout << "Current day is " << day[t->tm_wday] << endl;
32        break;
33
34        case 4: printf("Current time = %s", ctime(&curtime));
35        break;
36
37        default:
38            cout << "Invalid Input !!!" << endl;
39        break;
40    }
41
42    return 0;
43

```

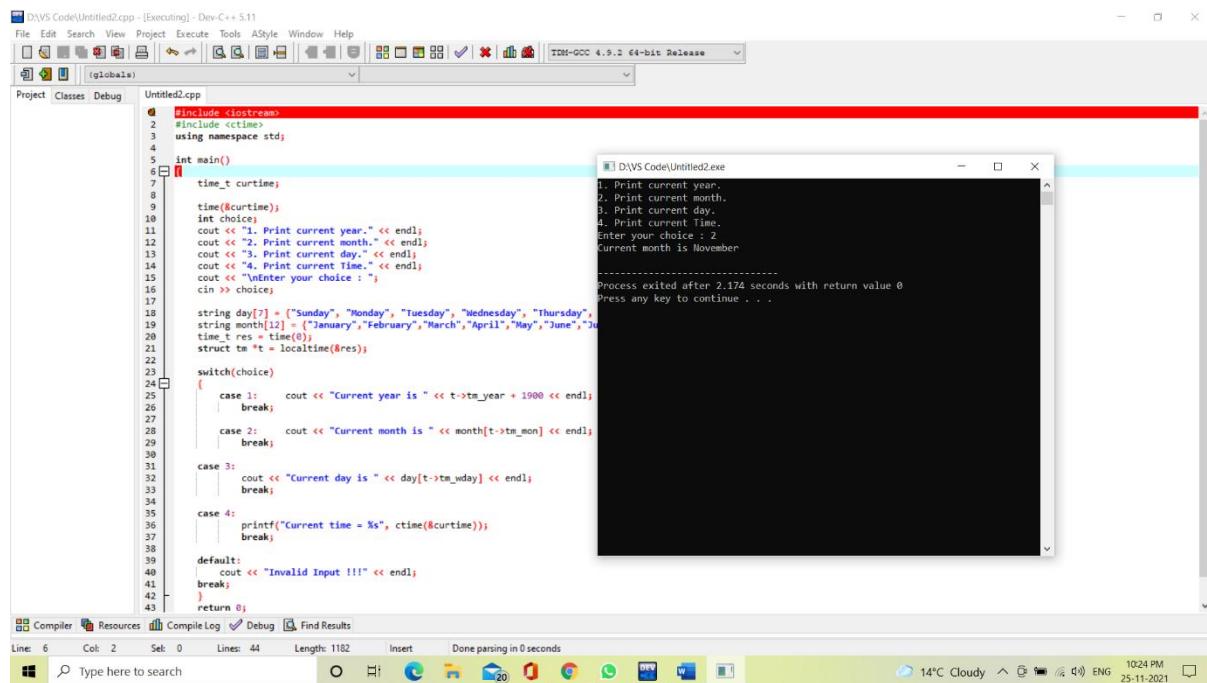
The terminal window shows the output:

1. Print current year.
2. Print current month.
3. Print current day.
4. Print current Time.

Enter your choice : 1
Current year is 2021

Process exited after 1.687 seconds with return value 0
Press any key to continue . . .

b). Current Month :



The screenshot shows the Dev-C++ IDE interface. The code in the editor is identical to part (a), but the user chose option 2. The terminal window shows the output:

1. Print current year.
2. Print current month.
3. Print current day.
4. Print current Time.

Enter your choice : 2
Current month is November

Process exited after 2.174 seconds with return value 0
Press any key to continue . . .

c). Current Day :

The screenshot shows the Dev-C++ IDE interface. The code in the editor is:

```

1 #include <iostream>
2 #include <ctime>
3 using namespace std;
4
5 int main()
6 {
7     time_t curtime;
8     time(&curtime);
9     int choice;
10    cout << "1. Print current year." << endl;
11    cout << "2. Print current month." << endl;
12    cout << "3. Print current day." << endl;
13    cout << "4. Print current Time." << endl;
14    cout << "\nEnter your choice : ";
15    cin >> choice;
16
17    string day[7] = {"Sunday", "Monday", "Tuesday", "Wednesday", "Thursday",
18    "Friday", "Saturday"};
19    string month[12] = {"January", "February", "March", "April", "May", "June",
20    "July", "August", "September", "October", "November", "December"};
21    time_t res = time(0);
22    struct tm *t = localtime(&res);
23
24    switch(choice)
25    {
26        case 1: cout << "Current year is " << t->tm_year + 1900 << endl;
27        break;
28
29        case 2: cout << "Current month is " << month[t->tm_mon] << endl;
30        break;
31
32        case 3: cout << "Current day is " << day[t->tm_wday] << endl;
33        break;
34
35        case 4: printf("Current time = %s", ctime(&curtime));
36        break;
37
38        default: cout << "Invalid Input !!!" << endl;
39        break;
40    }
41
42    return 0;
43

```

The terminal window shows the output:

```

1. Print current year.
2. Print current month.
3. Print current day.
4. Print current Time.
Enter your choice : 3
Current day is Thursday

```

Process exited after 2.082 seconds with return value 0

Press any key to continue . . .

d). Current Time and Invalid Choice :

The screenshot shows the Dev-C++ IDE interface. The code in the editor is identical to the one in section c), but the user enters an invalid choice (4).

The terminal window shows the output:

```

1. Print current year.
2. Print current month.
3. Print current day.
4. Print current Time.
Enter your choice : 4
Current time = Thu Nov 25 22:25:20 2021

```

Process exited after 3.284 seconds with return value 0

Press any key to continue . . .

Task3:**v1. Print using reverse method:**

1 2 3	9 8 7
4 5 6	==>
7 8 9	6 5 4
	3 2 1

Source Code :

```
#include <iostream>
using namespace std;

int main ()
{
int arr[3][3], i, j;
cout << "Enter the values in the array : \n";
for (i=0; i<3; i++)
{
for (j=0; j<3; j++)
{
cin >> arr[i][j];
}
}
cout <<"Entered elements in the array are : "<<endl;
for (i=0; i<3; i++)
{
for (j=0; j<3; j++)
{
cout << arr[i][j] << " ";
}
cout << endl;
}

cout << "\nThe resversed array is : \n";

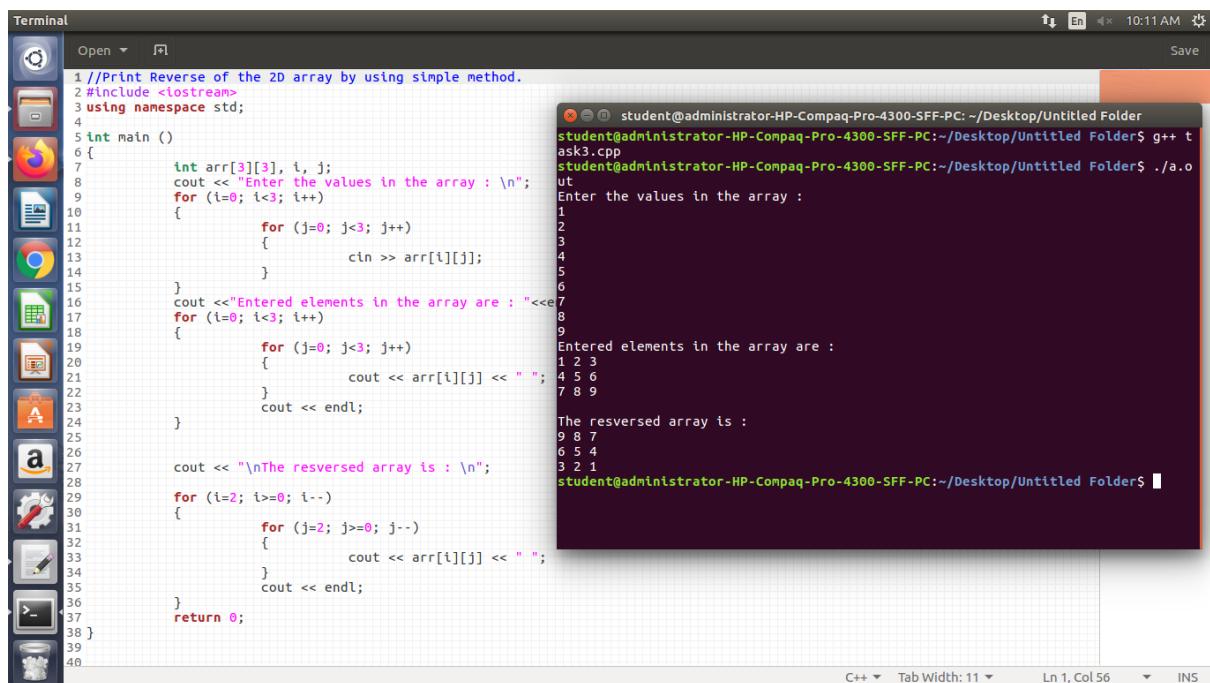
for (i=2; i>=0; i--)
{
for (j=2; j>=0; j--)
{
cout << arr[i][j] << " ";
}
cout << endl;
}
```

```

}
return 0;
}

```

Output



The screenshot shows a terminal window with two panes. The left pane displays the source code for a C++ program named 'ask3.cpp'. The right pane shows the terminal output where the user enters values for a 3x3 array, and the program prints the array and its reversed version.

```

1 //Print Reverse of the 2D array by using simple method.
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int arr[3][3], i, j;
8     cout << "Enter the values in the array : \n";
9     for (i=0; i<3; i++)
10    {
11        for (j=0; j<3; j++)
12        {
13            cin >> arr[i][j];
14        }
15    }
16    cout << "Entered elements in the array are : " << endl;
17    for (i=0; i<3; i++)
18    {
19        for (j=0; j<3; j++)
20        {
21            cout << arr[i][j] << " ";
22        }
23        cout << endl;
24    }
25
26
27    cout << "\nThe resversed array is : \n";
28
29    for (i=2; i>=0; i--)
30    {
31        for (j=2; j>=0; j--)
32        {
33            cout << arr[i][j] << " ";
34        }
35        cout << endl;
36    }
37
38 }
39
40

```

```

student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ t
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.o
ut
Enter the values in the array :
1
2
3
4
5
6
7
8
9
Entered elements in the array are :
1 2 3
4 5 6
7 8 9
The resversed array is :
9 8 7
6 5 4
3 2 1
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ 

```

Task3:**v2. Print using (10- arr[i][j]) method:**

1 2 3	9 8 7
4 5 6	==> 6 5 4
7 8 9	3 2 1

Source Code :

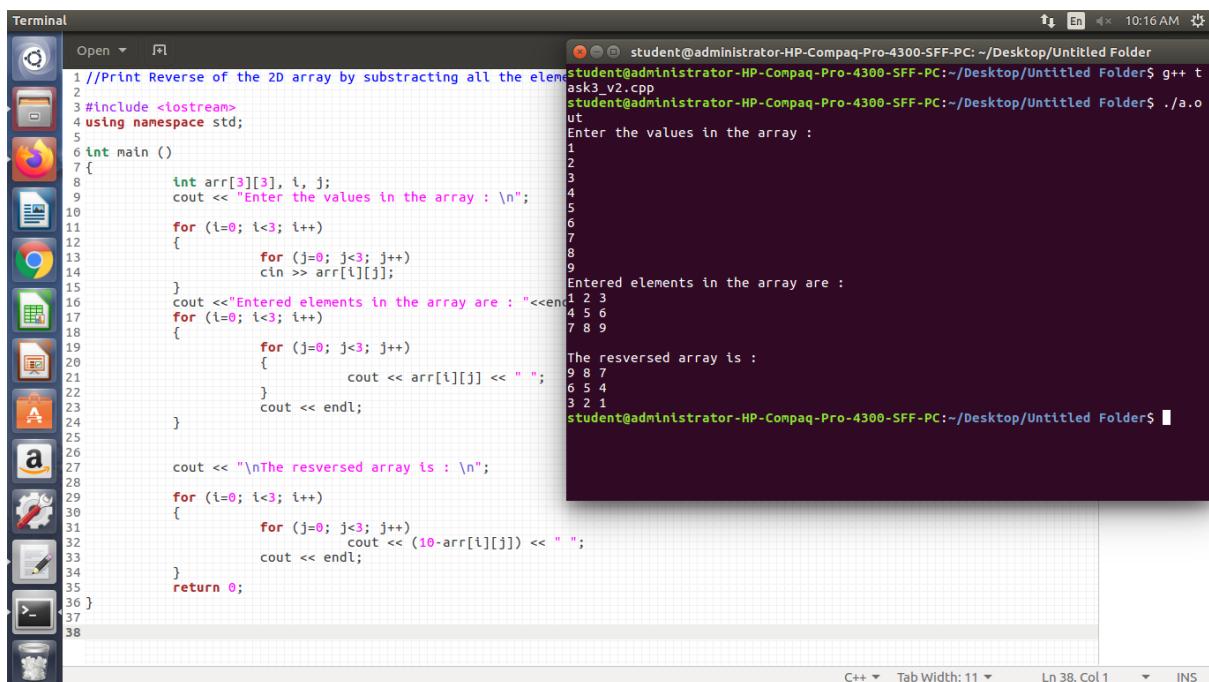
```
#include <iostream>
using namespace std;
int main ()
{
    int arr[3][3], i, j;
    cout << "Enter the values in the array : \n";
    for (i=0; i<3; i++)
    {
        for (j=0; j<3; j++)
            cin >> arr[i][j];
    }
    cout <<"Entered elements in the array are : "<<endl;
    for (i=0; i<3; i++)
    {
        for (j=0; j<3; j++)
        {
            cout << arr[i][j] << " ";
        }
        cout << endl;
    }
    cout << "\nThe resversed array is : \n";
    for (i=0; i<3; i++)
    {
        for (j=0; j<3; j++)
            cout << (10-arr[i][j]) << " ";
        cout << endl;
    }
}
```

```

    }
    return 0;
}

```

Output



The screenshot shows a terminal window with the following content:

```

Terminal Open ▾ student@administrator-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder
1 //Print Reverse of the 2D array by subtracting all the elem student@administrator-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder$ g++ t
2                                         ask3_v2.cpp
3 #include <iostream>                      student@administrator-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder$ ./a.o
4 using namespace std;                      ut
5
6 int main ()                                Enter the values in the array :
7 {
8     int arr[3][3], i, j;                  1
9     cout << "Enter the values in the array : \n"; 2
10    for (i=0; i<3; i++)                  3
11    {
12        for (j=0; j<3; j++)              4
13            cin >> arr[i][j];           5
14    }                                     6
15    cout <<"Entered elements in the array are : "<<endl; 7
16    for (i=0; i<3; i++)                  8
17    {
18        for (j=0; j<3; j++)              9
19            cout << arr[i][j] << " ";      Entered elements in the array are :
20        cout << endl;                   1 2 3
21    }                                     4 5 6
22    cout << endl;                       7 8 9
23
24    cout << "\nThe resversed array is : \n";
25
26    for (i=0; i<3; i++)                  The resversed array is :
27    {
28        for (j=0; j<3; j++)              9 8 7
29            cout << (10-arr[i][j]) << " "; 6 5 4
30        cout << endl;                   3 2 1
31    }
32
33    return 0;
34
35
36 }
37
38

```

The terminal shows the execution of a C++ program named 't' (ask3_v2.cpp). It prompts the user to enter 9 values for a 3x3 matrix. The entered values are 1, 2, 3, 4, 5, 6, 7, 8, 9. The program then prints the original matrix and its transpose (reverse) below it.

Task3:

v3. Restore using reverse method [without creating new array]:

1 2 3	9 8 7
4 5 6	==> 6 5 4
7 8 9	3 2 1

Source Code :

```
#include <iostream>
using namespace std;

int main ()
{
int arr[3][3], i, j;
cout << "Enter the values in the array : \n";
for (i=0; i<3; i++)
{
for (j=0; j<3; j++)
{
cin >> arr[i][j];
}
}

cout <<"Entered elements in the array are : "<<endl;
for (i=0; i<3; i++)
{
for (j=0; j<3; j++)
{
cout << arr[i][j] << " ";
}
cout << endl;
}

cout << "\nThe resversed array is : \n";

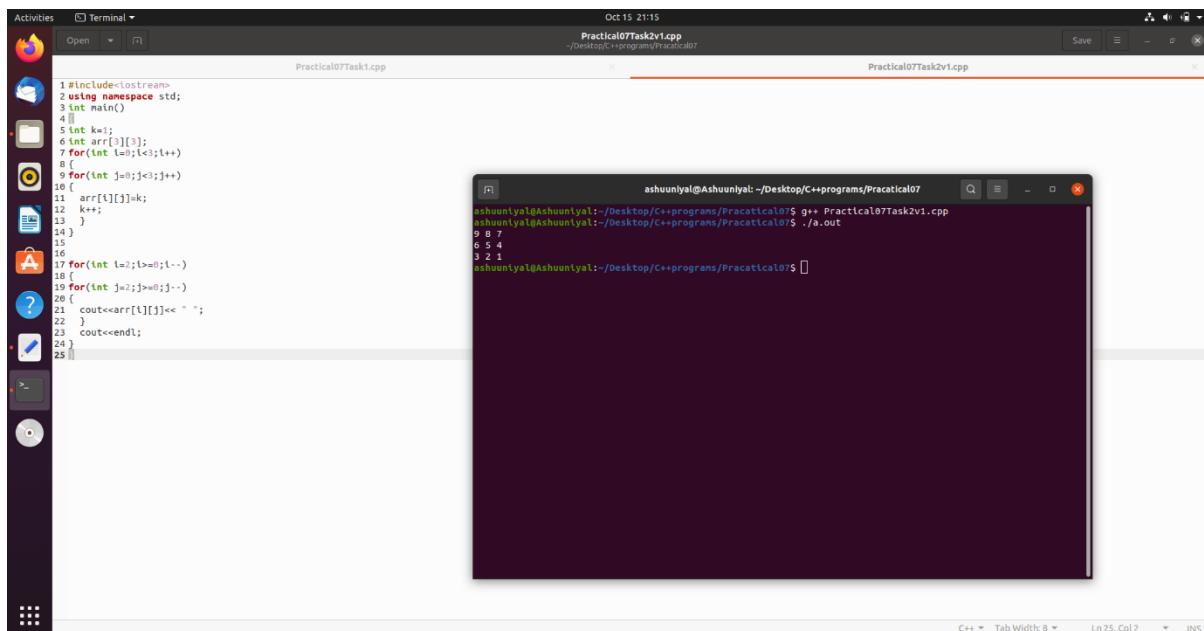
for (i=2; i>=0; i--)
{
for (j=2; j>=0; j--)
{
cout << arr[i][j] << " ";
```

```

}
cout << endl;
}
return 0;
}

```

Output



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "ashuuniyal@Ashuuniyal: ~/Desktop/C++programs/Practical07". The terminal content shows the execution of a C++ program named "Practical07Task2v1.cpp". The program's output is:

```

ashuuniyal@Ashuuniyal:~/Desktop/C++programs/Practical07$ g++ Practical07Task2v1.cpp
ashuuniyal@Ashuuniyal:~/Desktop/C++programs/Practical07$ ./a.out
9 8 7
6 5 4
3 2 1
ashuuniyal@Ashuuniyal:~/Desktop/C++programs/Practical07$ 

```

Task3:**v4. Restore using (10- arr[i][j]) method [without creating new array]:**

1 2 3	9 8 7
4 5 6	==> 6 5 4
7 8 9	3 2 1

Source Code :

```
#include<iostream>
using namespace std;
int main()
{
    int k=1;
    int arr[3][3];
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            arr[i][j]=k;
            k++;
        }
    }
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            arr[i][j]=10-arr[i][j];
        }
    }
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            cout<<arr[i][j]<<" ";
        }
        cout<<endl;
    }
}
```

Output

The screenshot shows the Visual Studio Code interface. The Explorer sidebar on the left lists files in the current directory (D:\). The main editor area displays a C++ program named Untitled1.cpp. The terminal at the bottom shows the output of running the program, which prints a 3x3 matrix of numbers (9, 8, 7; 6, 5, 4; 3, 2, 1) to the console.

```

File Edit Selection View Go Run Terminal Help
EXPLORER D: .vscode $RECYCLE.BIN Python VS Code ayush.cpp ayush1.cpp hello.c hello.exe Untitled1.cpp Untitled1.exe Untitled2.cpp Untitled2.exe
UNTITLED1.CPP X
VS Code > Untitled1.cpp > main()
7   for(int i=0;i<3;i++)
8   {
9     for(int j=0;j<3;j++)
10    {
11      arr[i][j]=k;
12      k++;
13    }
14  }
15  for(int i=0;i<3;i++)
16  {
17    for(int j=0;j<3;j++)
18    {
19      arr[i][j]=10-arr[i][j];
20    }
21  }
22  for(int i=0;i<3;i++)
23  {
24    for(int j=0;j<3;j++)
25    {
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS D:\> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
9 8 7
6 5 4
3 2 1
PS D:\VS Code>

```

Task4: Restore the same values in the same array, arr[3][3]:

1 2 3	1 1 1
4 5 6	==> 2 2 2
7 8 9	3 3 3

v1. Use row loop [int i, for all j]

Source Code :

```
#include<iostream>
using namespace std;
int main()
{
    int k=1;
    int arr[3][3];
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            arr[i][j]=k;
            k++;
        }
    }
    for(int i=1;i<=3;i++)
    {
        for(int j=1;j<=3;j++)
        {
            cout<<i <<" ";
        }
        cout<<endl;
    }
}
```

Output

The screenshot shows the Visual Studio Code interface. The code editor displays the following C++ code:

```

1 using namespace std;
2 int main()
3 {
4     int k=1;
5     int arr[3][3];
6     for(int i=0;i<3;i++)
7     {
8         for(int j=0;j<3;j++)
9         {
10            arr[i][j]=k;
11            k++;
12        }
13    }
14    for(int i=1;i<=3;i++)
15    {
16        for(int j=1;j<=3;j++)
17        {
18            cout<<i <<" ";
19        }
20    }

```

The terminal window shows the command and output of the program:

```

PS D:\VS Code> cd "d:\VS Code" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
1 1 1
2 2 2
3 3 3
PS D:\VS Code>

```

The file explorer on the left shows the project structure with files like ayush.cpp, ayush1.cpp, hello.c, hello.exe, Untitled1.cpp, Untitled1.exe, Untitled2.cpp, and Untitled2.exe.

Task4: Restore the same values in the same array, arr[3][3]:

1 2 3	1 1 1
4 5 6 ==>	2 2 2
7 8 9	3 3 3

v2. Use arr[i][N-1]/3, at each place

Source Code :

```
#include<iostream>
using namespace std;
int main()
{
    int k=1;
    int arr[3][3];
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            arr[i][j]=k;
            k++;
        }
    }
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            cout<<arr[i][j];
        }
        cout<<endl;
    }
}
```

Output

The screenshot shows the Visual Studio Code interface. The code editor displays the following C++ code:

```

3 int main()
4 {
5     int k=1;
6     int arr[3][3];
7     for(int i=0;i<3;i++)
8     {
9         for(int j=0;j<3;j++)
10    {
11        arr[i][j]=k;
12        k++;
13    }
14 }
15 for(int i=0;i<3;i++)
16 {
17     for(int j=0;j<3;j++)
18     {
19         cout<<arr[i][j]<<endl;
20     }
21     cout<<endl;
22 }

```

The terminal window shows the command line output:

```

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6
PS D:\> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 ; if ($?) { .\Untitled1 }

1 1 1
2 2 2
3 3 3
PS D:\VS Code>

```

The status bar at the bottom right indicates the following information: Line 24, Col 1, Spaces: 4, UTF-8, CRLF, Win32, 11:16 PM, 25-11-2021.

Task4: Restore the same values in the same array, arr[3][3]:

1 2 3	1 1 1	
4 5 6	==>	2 2 2
7 8 9		3 3 3

v3. Use, $\text{arr}[i][j] - (2*i + j)$

Source Code :

```
#include<iostream>
using namespace std;
int main()
{
int k=1;
int arr[3][3];
for(int i=0;i<3;i++)
{
for(int j=0;j<3;j++)
{
arr[i][j]=k;
k++;
}
}
for(int i=0;i<3;i++)
{
for(int j=0;j<3;j++)
{
cout<<arr[i][j]-(2*i+j);
}
cout<<endl;
}
}
```

Output

The screenshot shows the Visual Studio Code interface. The Explorer sidebar on the left lists files and folders. The main editor area contains the following C++ code:

```

5 int k=1;
6 int arr[3][3];
7 for(int i=0;i<3;i++)
8 {
9     for(int j=0;j<3;j++)
10    {
11        arr[i][j]=k;
12        k++;
13    }
14 }
15 for(int i=0;i<3;i++)
16 {
17     for(int j=0;j<3;j++)
18    {
19        cout<<arr[i][j]-(2*i+j);
20    }
21    cout<<endl;
22 }
23 []

```

The terminal tab at the bottom shows the command line output:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
1 1 1
2 2 2
3 3 3
PS D:\VS Code>

```

The status bar at the bottom right indicates the file is 1122 PM, 25-11-2021, and shows system information like temperature (13°C), battery level, and network connection.

Task5: Store these in an array[4][4] in given fassion and then print:

```
*  
* *  
* * *  
* * * *
```

Source Code :

```
#include<iostream>  
using namespace std;  
int main()  
{  
    int i, j;  
    for(i = 1; i <= 4; i++)  
    {  
        for(j = 1; j <= 4; j++)  
        {  
            if(j <= i)  
                cout << "*";  
            else  
                cout << " ";  
        }  
        cout << "\n";  
    }  
}
```

Output

The screenshot shows a terminal window with a dark theme. On the left, there is a vertical dock with various icons for applications like a file manager, browser, and terminal. The main area of the terminal has two panes. The left pane displays the following C++ code:

```
1 #include<iostream>
2 using namespace std;
3 int main()
4 {
5     int i, j;
6     for(i = 1; i <= 4; i++)
7     {
8         for(j = 1; j <= 4; j++)
9         {
10            if(j <= i)
11                cout << " ";
12            else
13                cout << "*";
14        }
15    cout << "\n";
16 }
17
18
19
```

The right pane shows the terminal output of the code execution:

```
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ task5.cpp
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
*
**
***
****
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$
```

At the bottom of the terminal window, there are status indicators: C++ ▾, Tab Width: 11 ▾, Ln 19, Col 1 ▾, and INS.

Task6: Store these in an array[4][4] in given fashion and then print:

```
* * * *
* * *
* *
*
```

Source Code :

```
#include<iostream>
using namespace std;
int main()
{
    int i, j;
    for(i = 1; i <= 4; i++)
    {
        for(j = 1; j <=4; j++)
        {
            if(i <= j)
                cout <<"*";
            else
                cout<<" ";
        }
        cout <<"\n";
    }
}
```

Output

The screenshot shows a terminal window with a dark theme. On the left, there is a vertical dock with various icons for file operations, browser, and system tools. The main terminal area has a light gray background with a grid pattern. It displays the following C++ code:

```
1 #include<iostream>
2 using namespace std;
3 int main()
4 {
5     int i, j;
6     for(i = 1; i <= 4; i++)
7     {
8         for(j = 1; j <= 4; j++)
9         {
10            if(i <= j)
11                cout << " * ";
12            else
13                cout << " * ";
14        }
15    cout << "\n";
16 }
17
18
19
```

Below the code, the terminal shows the command-line interface with the user's session information and the output of the program:

```
student@administrator-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder$ g++ task6.cpp
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
*****
****
 ***
 *
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$
```

At the bottom of the terminal window, there are status indicators: C++ (language mode), Tab Width: 11, Ln 19, Col 1, and INS (insert mode).

Task7: Store these in an array[4][4] in given fashion and then print:

```
*  
* *  
* * *  
* * * *
```

Source Code :

```
#include<iostream>  
using namespace std;  
int main()  
{  
    int i, j;  
    for(i = 1; i <= 4; i++)  
    {  
        for(j = 1; j <= 4; j++)  
        {  
            if(j >= 5-i)  
                cout << "*";  
            else  
                cout << " ";  
        }  
        cout << "\n";  
    }  
}
```

Output

A screenshot of a terminal window titled "Terminal". The window shows a C++ program being run. The code includes a nested loop structure where the inner loop's condition is dependent on the outer loop's value. The output shows the resulting pattern of asterisks and spaces.

```
student@administrator-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder$ g++ task7.cpp
student@administrator-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder$ ./a.out
    *
   **
  ***
 ****
student@administrator-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Untitled Folder$
```

The terminal interface includes a toolbar with icons for file operations like Open, Save, and Print, and a status bar at the bottom indicating the current tab width (11), line number (Ln 19), column number (Col 1), and mode (INS).

Task8: Store these in an array[4][4] in given fashion and then print:

* * * *
* * *
* *
*

Source Code :

```
#include<iostream>
using namespace std;
int main()
{
    int i, j;
    for(i = 1; i <= 4; i++)
    {
        for(j = 1; j <= 4; j++)
        {
            if(j <= 5-i)
                cout << "*";
            else
                cout << " ";
        }
        cout << "\n";
    }
}
```

Output

The screenshot shows a terminal window titled "Terminal" with a dark theme. On the left is a vertical dock with icons for various applications like a browser, file manager, and terminal. The main area contains two panes. The left pane shows the following C++ code:

```
1 #include<iostream>
2 using namespace std;
3 int main()
4 {
5     int i, j;
6     for(i = 1; i <= 4; i++)
7     {
8         for(j = 1; j <= 4; j++)
9         {
10            if(j <= 5)
11                cout << " ";
12            else
13                cout << " ";
14        }
15    cout << "\n";
16 }
17
18
19
```

The right pane shows the terminal output of the code execution:

```
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ g++ task8.cpp
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$ ./a.out
****
**
*
student@administrator-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Untitled Folder$
```

At the bottom of the terminal window, there are status indicators: "C++" dropdown, "Tab Width: 11" dropdown, "Ln 19, Col 1" status bar, and "INS" status bar.

Practical No. 08

Q. Write C++ code for below mentioned tasks?

Pointer, Function, Inline Function, Recursion in C++:

Task1: Will the program through an error and if yes then why?

```
int *p = {10,20,20};
cout << *p;
p++;
cout << *p;
```

Source Code :

```
#include<iostream>

using namespace std;

int main()

{
    int *p = { 10, 20, 20 };

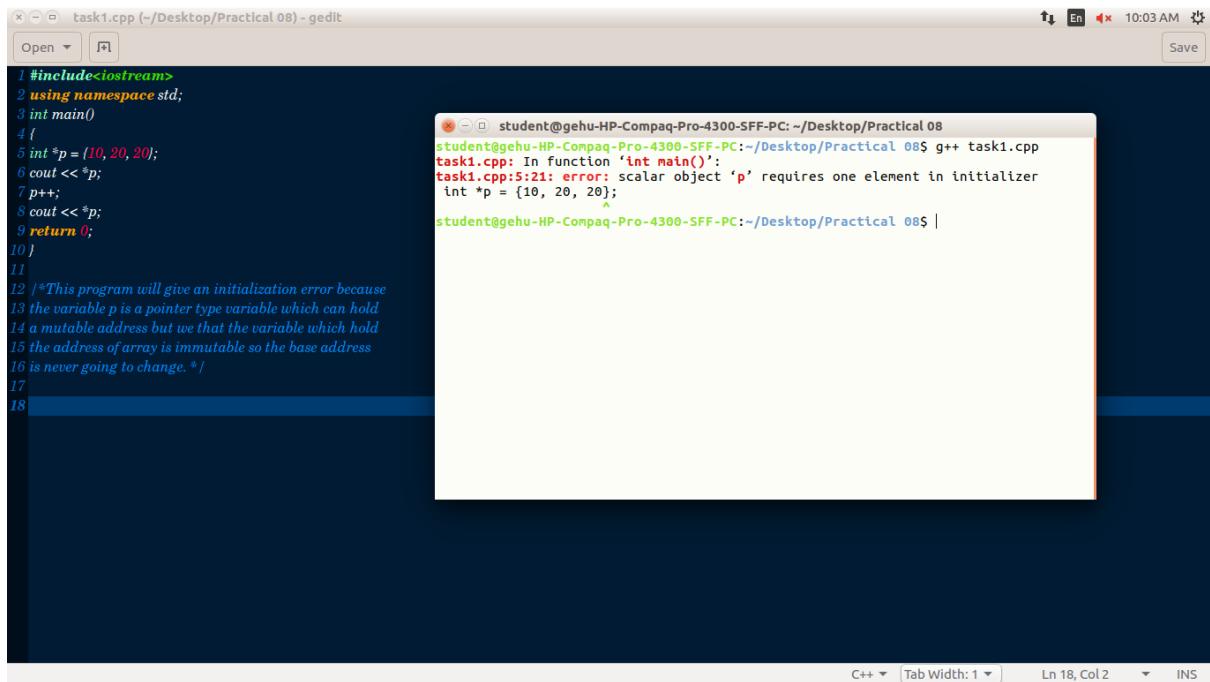
    cout << *p;

    p++;

    cout << *p;

    return 0;
}
```

Output



The screenshot shows a terminal window titled "task1.cpp (~/Desktop/Practical 08) - gedit". The code in the editor is:

```

1 #include<iostream>
2 using namespace std;
3 int main()
4 {
5     int *p = {10, 20, 20};
6     cout << *p;
7     p++;
8     cout << *p;
9     return 0;
10}
11
12 /*This program will give an initialization error because
13 the variable p is a pointer type variable which can hold
14 a mutable address but we that the variable which hold
15 the address of array is immutable so the base address
16 is never going to change. */
17
18

```

The terminal output shows the command "g++ task1.cpp" being run, followed by an error message:

```

student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ g++ task1.cpp
task1.cpp: In function 'int main()':
task1.cpp:5:21: error: scalar object 'p' requires one element in initializer
    int *p = {10, 20, 20};^
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ |

```

The terminal window has a dark background and light-colored text. The code editor has a light background and dark text.

Task2: Output of this program?

V1. Issue?

```
int arr[] = {10,20,30};  
cout << *arr;  
cout << arr;  
arr++;  
cout << *arr;
```

Source Code :

```
#include<iostream>  
  
using namespace std;  
  
int main()  
{  
    int arr[] = { 10, 20, 30 };  
    cout << *arr;  
    cout << arr;  
    arr++;  
    cout << *arr;  
  
    return 0;  
}
```

Output

The screenshot shows a terminal window with the following text:

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ g++ task2.cpp
task2.cpp: In function 'int main()':
task2.cpp:8:4: error: lvalue required as increment operand
    arr++;^
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ |
```

The terminal window is titled "task2.cpp (~/Desktop/Practical 08) - gedit". The status bar at the bottom right shows "C++" and "Tab Width: 1".

Task2: Output of this program?

V2.How to resolve above issue?

```
int arr[] = {10,20,30};
cout << *arr;
cout << arr;
cout << *(?);
```

Source Code :

```
#include<iostream>

using namespace std;

int main()

{
    int arr[] = { 10, 20, 30};

    cout << *arr << endl;
    cout << arr << endl;

    cout << *(arr+1) << endl;

    return 0;
}
```

Output

```
#include<iostream>
using namespace std;
int main()
{
    int arr[] = {10, 20, 30};
    cout << *arr << endl;
    cout << *(arr+1) << endl;
    return 0;
}
```

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ g++ task2v2.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ ./a.out
10
0x7ffc49766e50
20
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ |
```

Task3: Output of this program?

V1. Output?

```
int a = 10;
int *p;
int **q;
p = &a;
q = &p;
cou << *p;
cou << **q;
```

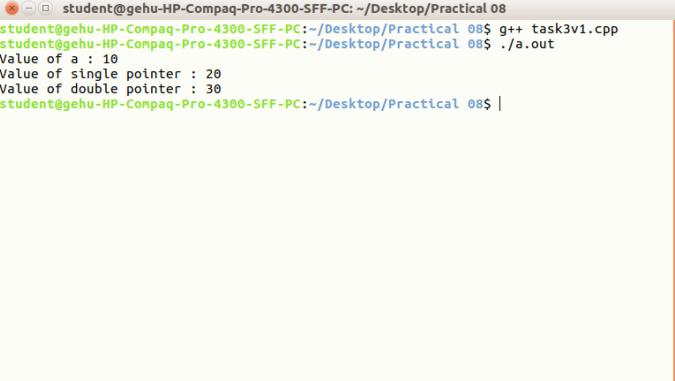
Source Code :

```
#include<iostream>

using namespace std;

int main()
{
    int a = 10;
    int *p = &a;
    int **q = &p;
    cout << "Value of a : "<< a << endl;
    *p = 20;
    cout << "Value of single pointer : "<< *p << endl;
    **q = 30;
    cout << "Value of double pointer : "<< **q << endl;
    return 0;
}
```

Output



```

1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     int a = 10;
7     int *p = &a;
8     int **q = &p;
9
10    cout << "Value of a : " << a << endl;
11
12    *p = 20;
13    cout << "Value of single pointer : " << *p << endl;
14
15    **q = 30;
16    cout << "Value of double pointer : " << **q << endl;
17    return 0;
18 }
19
20

```

The terminal output shows:

```

student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Practical 08$ g++ task3v1.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Practical 08$ ./a.out
Value of a : 10
Value of single pointer : 20
Value of double pointer : 30
student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Practical 08$ |

```

Task3: Output of this program?

V2. Change the value of a using q pointer to pointer.

Source Code :

```
#include<iostream>
using namespace std;

int main()
{
    int a = 10;
    int *p = &a;
    int **q = &p;

    cout << "Value of a : " << a << endl;

    **q = 30;
    cout << "Value of double pointer : " << **q << endl;
    return 0;
}
```

Output

```
x - task3v2.cpp (~/Desktop/Practical 08) - gedit
Open  Save
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     int a = 10;
7     int *p = &a;
8     int **q = &p;
9
10 cout << "Value of a : " << a << endl;
11
12 **q = 30;
13 cout << "Value of double pointer : " << **q << endl;
14 return 0;
15 }
16
17
```

```
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ g++ task3v2.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ ./a.out
Value of a : 10
Value of double pointer : 30
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ |
```

C++ Tab Width: 1 Ln 17, Col 1 INS

Task4: Find factorial of a number using function but not recursion.

Source Code :

```
#include<iostream>
using namespace std;

int main()
{
int a ;
cout << "Enter a number of which you want to calcualte factoiral : ";
cin >> a ;
int fact =1;
while(a)
{
fact *=a;
a--;
}
cout << "Factoiral of number is : " << fact << endl;
return 0;
}
```

Output

The screenshot shows a terminal window titled "student@gehu-HP-Compaq-Pro-4300-SFF-PC: ~/Desktop/Practical 08\$". The window displays the following text:

```
#include<iostream>
using namespace std;
int main()
{
    int a;
    cout << "Enter a number of which you want to calculate factorial : ";
    cin >> a;
    int fact = 1;
    while(a)
    {
        fact *= a;
        a--;
    }
    cout << "Factorial of number is :" << fact << endl;
    return 0;
}

```

After the code is run, the terminal prompts for input: "Enter a number of which you want to calculate factorial :". The user enters "5". The terminal then outputs: "Factorial of number is : 120".

Task5: Find factorial of a number using recursion.**Source Code :**

```
#include<iostream>
using namespace std;

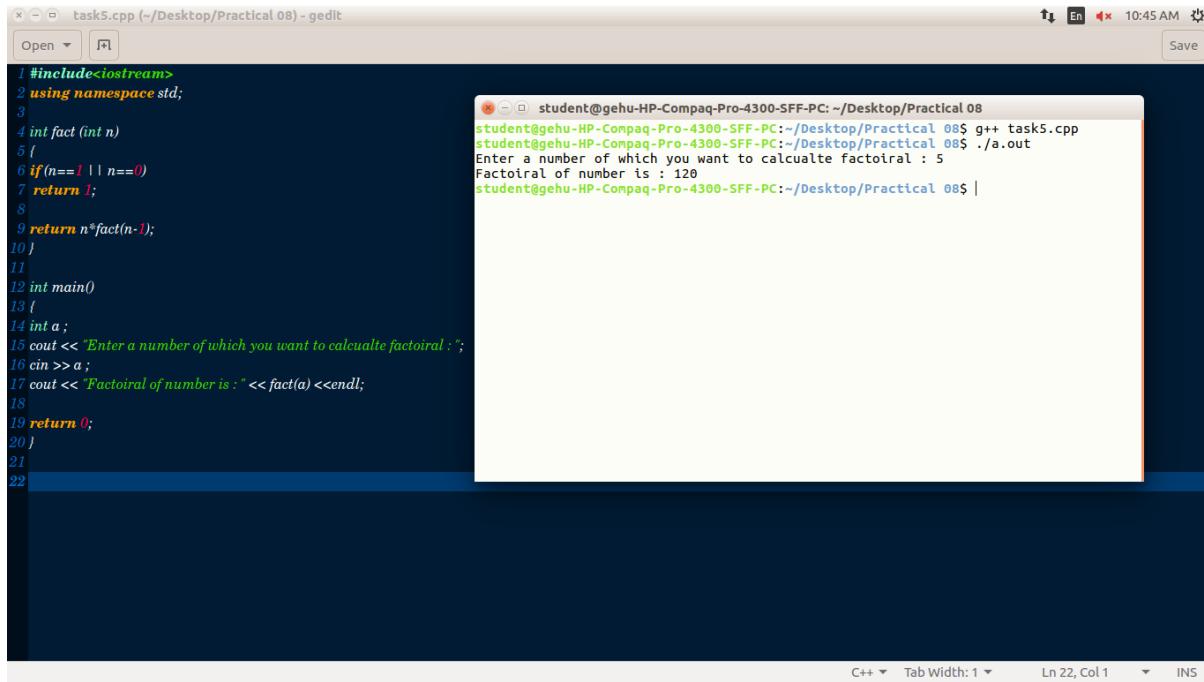
int fact (int n)
{
if (n==1 || n==0)
    return 1;

return n*fact(n-1);
}

int main()
{
int a ;
cout << "Enter a number of which you want to calculate factorial : ";
cin >> a ;
cout << "Factorial of number is : " << fact(a) << endl;

return 0;
}
```

Output



The screenshot shows a terminal window titled "task5.cpp (~/Desktop/Practical 08) - gedit". The code in the editor is:

```

1 #include<iostream>
2 using namespace std;
3
4 int fact (int n)
5 {
6     if(n==1 || n==0)
7         return 1;
8
9     return n*fact(n-1);
10}
11
12 int main()
13 {
14     int a ;
15     cout << "Enter a number of which you want to calculate factorial : ";
16     cin >> a ;
17     cout << "Factorial of number is :" << fact(a) << endl;
18
19     return 0;
20}
21
22

```

The terminal window shows the output of the program:

```

student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ g++ task5.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ ./a.out
Enter a number of which you want to calculate factorial : 5
Factorial of number is : 120
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ |

```

At the bottom of the terminal window, status indicators show "C++" and "Tab Width: 1".

Task6: Series Problem using recursion for n series

2, (2² + 2), (3³ + 3), (4⁴ + 4), (5⁵ + 5),

Hint:

$$\mathbf{n * ((n-1)^(n-1) + (n-1))}$$

Source Code :

```
#include<bits/stdc++.h>

using namespace std;

void series(int n)

{
    if(n==1)

        return;

    series(n-1);

    cout<<n*(pow(n-1,n-1)+n-1)<<" ";

    return;
}

int main()

{
    int n;

    cout <<"Enter how many elements you want in series : ";

    cin>>n;

    series(n);

    return 0;
}
```

Output

```

task6.cpp (~/Desktop/Practical 08) - gedit
Open ▾  Save
1 #include<bits/stdc++.h>
2 using namespace std;
3
4 void series(int n)
5 {
6     if(n==1)
7         return;
8
9     series(n-1);
10    cout<<n*(pow(n-1,n-1)+n-1)<<" ";
11    return;
12 }
13
14 int main()
15 {
16     int n;
17     cout << "Enter how many elements you want in series : ";
18     cin>>n;
19     series(n);
20     return 0;
21 }
22
23
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ g++ task6.cpp
student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ ./a.out
Enter how many elements you want in series : 7
4 18 120 1308 18780 326634 student@gehu-HP-Compaq-Pro-4300-SFF-PC:~/Desktop/Practical 08$ 

```

C++ ▾ Tab Width: 1 ▾ Ln 23, Col 1 ▾ INS

Task7: Perform Call by value, call by Address for swapping value of a and b:

int a = 10;

int b = 20;

V1. Swap(a,b); //call by Value [void swap(int a, int b){}]

Source Code :

```
#include<iostream>

using namespace std;

void swap(int a, int b)

{
    int temp=a;
    a=b;
    b=temp;

    cout<<"Swap value in swap function : "<<a<<" "<<b<<endl;
}

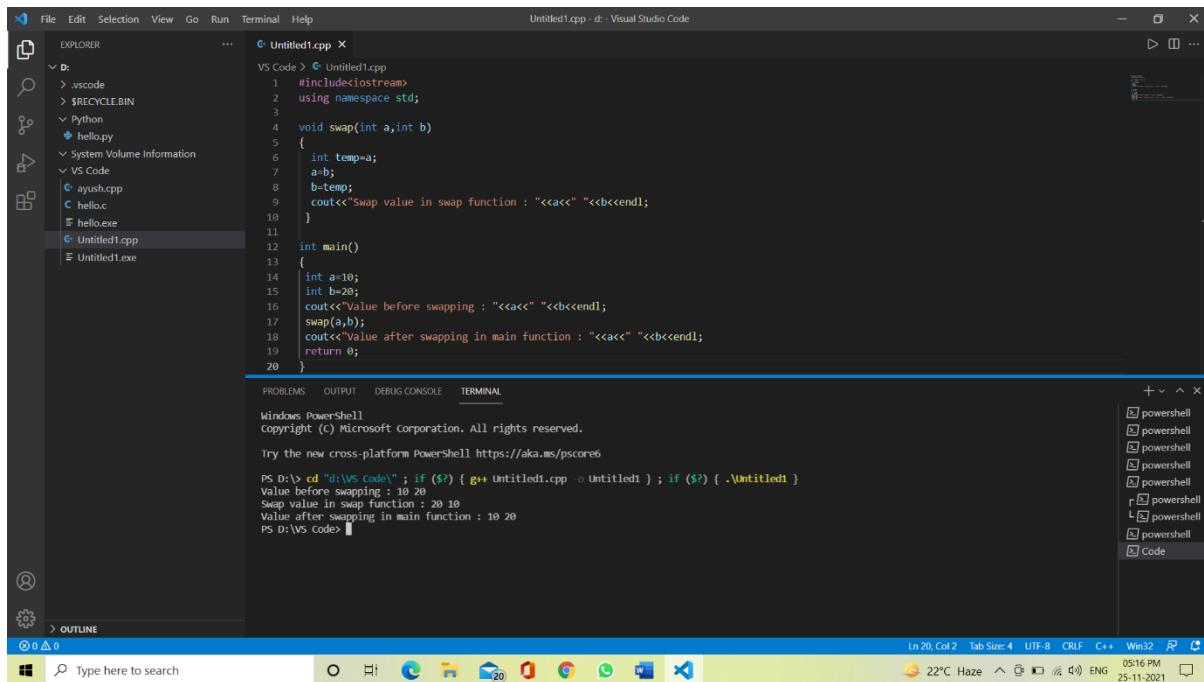
int main()

{
    int a=10;
    int b=20;

    cout<<"Value before swapping : "<<a<<" "<<b<<endl;
    swap(a,b);

    cout<<"Value after swapping in main function : "<<a<<" "<<b<<endl;
    return 0;
}
```

Output



The screenshot shows a Visual Studio Code interface with the following details:

- File Explorer:** Shows a project structure with files: .vscode, \$RECYCLE.BIN, Python, System Volume Information, VS Code, ayush.cpp, hello.exe, Untitled1.cpp, and Untitled1.exe.
- Code Editor:** Displays the content of Untitled1.cpp:

```

1 #include<iostream>
2 using namespace std;
3
4 void swap(int a,int b)
5 {
6     int temp=a;
7     a=b;
8     b=temp;
9     cout<<"Swap value in swap function : "<<a<<" "<<b<<endl;
10 }
11
12 int main()
13 {
14     int a=10;
15     int b=20;
16     cout<<"Value before swapping : "<<a<<" "<<b<<endl;
17     swap(a,b);
18     cout<<"Value after swapping in main function : "<<a<<" "<<b<<endl;
19     return 0;
20 }
```
- Terminal:** Shows a Windows PowerShell session output:

```

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 ; if ($?) { .\Untitled1 }

Value before swapping : 10 20
Swap value in swap function : 20 10
Value after swapping in main function : 20 10
PS D:\VS Code> 
```
- Bottom Status Bar:** Includes file navigation icons, a search bar with placeholder "Type here to search", system status (22°C Haze), and a date/time stamp (25-11-2021 05:16 PM).

Task7: Perform Call by value, call by Address for swapping value of a and b:

int a = 10;

int b = 20;

V2. Swap(a,b); //call by Value [void swap(int &a, int &b){}]

Source Code :

```
#include<iostream>
using namespace std;
void swap(int &a, int &b)
{
    int temp=a;
    a=b;
    b=temp;
    cout<<"Swapped value in swap function : "<<a<<" "<<b<<endl;
}
int main()
{
    int a=10;
    int b=20;
    cout<<"Value before swapping : "<<a<<" "<<b<<endl;
    swap(a,b);
    cout<<"Value after swapping in main function : "<<a<<" "<<b<<endl;
    return 0;
}
```

Output

The screenshot shows a Visual Studio Code interface with the following details:

- File Explorer:** Shows a tree view of the project structure under "D:\": .vscode, \$RECYCLE.BIN, Python, hello.py, System Volume Information, VS Code, ayush.cpp, hello.c, hello.exe, Untitled1.cpp, and Untitled1.exe.
- Code Editor:** Displays the content of `Untitled1.cpp`. The code defines a swap function that swaps two integers and prints the values before and after swapping. The terminal output shows the execution of the program.
- Terminal:** Shows the command `cd "d:\VS Code\" ; g++ Untitled1.cpp -o Untitled1` being run, followed by the program's output: "Value before swapping : 10 20", "Swapped value in swap function : 20 10", and "Value after swapping in main function : 20 10".
- Sidebar:** Includes icons for search, file operations, and a "Code" section with multiple PowerShell session entries.
- Bottom Bar:** Shows the status bar with "Ln 18, Col 2", "Tab Size: 4", "UTF-8", "CRLF", "Win32", and the date/time "25-11-2021 05:22 PM".

Task7: Perform Call by value, call by Address for swapping value of a and b:

int a = 10;

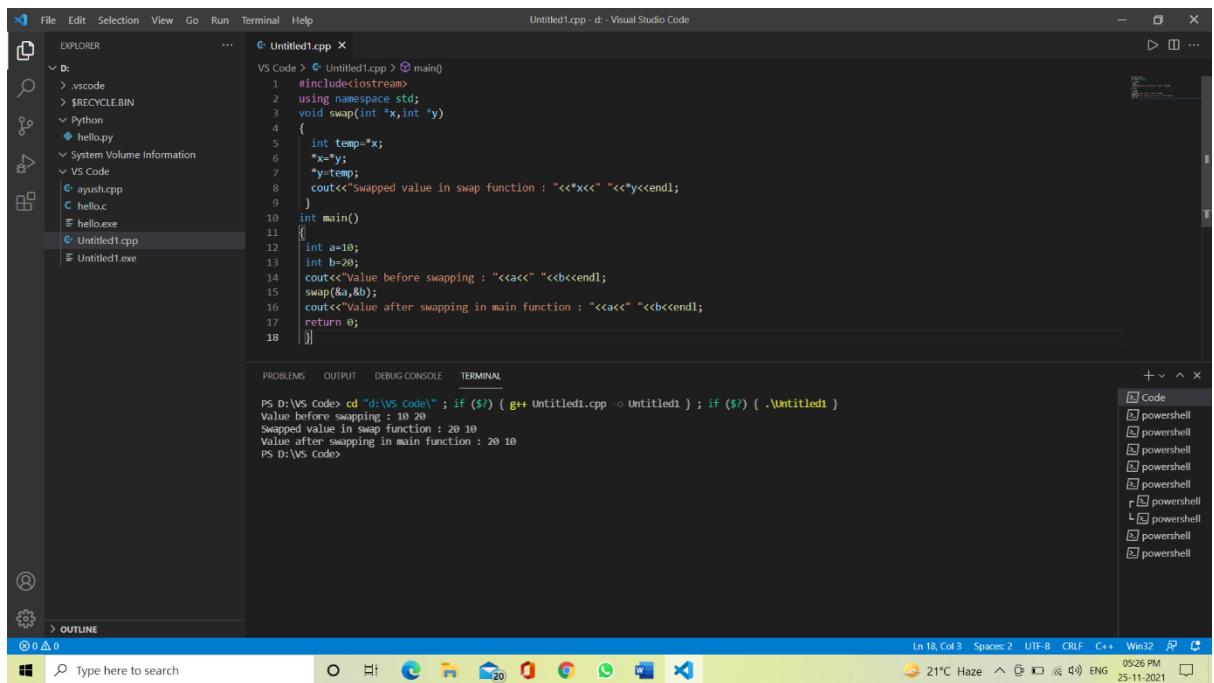
int b = 20;

V3. Swap(&a,&b); //call by Address

Source Code :

```
#include<iostream>
using namespace std;
void swap(int *x,int *y)
{
    int temp=*x;
    *x=*y;
    *y=temp;
    cout<<"Swapped value in swap function : "<<*x<<" "<<*y<<endl;
}
int main()
{
    int a=10;
    int b=20;
    cout<<"Value before swapping : "<<a<<" "<<b<<endl;
    swap(&a,&b);
    cout<<"Value after swapping in main function : "<<a<<" "<<b<<endl;
    return 0;
}
```

Output



```

File Edit Selection View Go Run Terminal Help
... Untitled1.cpp - d: - Visual Studio Code
EXPLORER D: ...
VS Code > Untitled1.cpp > main()
1 #include<iostream>
2 using namespace std;
3 void swap(int *x,int *y)
4 {
5     int temp=*x;
6     *x=*y;
7     *y=temp;
8     cout<<"Swapped value in swap function : "<<x<<" "<<y<<endl;
9 }
10 int main()
11 {
12     int a=10;
13     int b=20;
14     cout<<"Value before swapping : "<<a<<" "<<b<<endl;
15     swap(&a,&b);
16     cout<<"Value after swapping in main function : "<<a<<" "<<b<<endl;
17     return 0;
18 }

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
Value before swapping : 10 20
Swapped value in swap function : 20 10
Value after swapping in main function : 20 10
PS D:\VS Code>

```

OUTLINE

Ln 18, Col 3 Spaces: 2 UTF-8 CR/LF C++ Win32 21°C Haze 05:26 PM 25-11-2021

Practical No. 09

Q. Write C++ code for below mentioned tasks?

Class, Object, Constructor, Static Data Members, friend function in C++:

Task1: Class and Object in C++

a. WAP to assign and print the roll number, phone number and address of two students having names "Sam" and "John" respectively by creating two objects of the class 'Student'.

Source Code :

```
#include<iostream>
#include <string>
using namespace std;

class Student{
public:
    string name;
    int rollNo;
    unsigned long int phNo;
    string add ;

    void printDetails()
    {
        cout << "Name : " <<name << endl << "Roll No : "<< rollNo<< endl <<
        "Phone No : " << phNo << endl << "Address : " <<add<< endl<< endl;
    }

    void getDetails()
    {
        cout << "Enter Name : ";
        cin >> name;
        cout <<"Enter RollNo: ";
        cin >>rollNo;
        cout << "Enter Phone Number: ";
        cin >> phNo;
        cout <<"Enter Address: ";
        cin >>add;
        cout << endl;
    }
}
```

```
    }  
};  
  
int main()  
{  
    Student obj1, obj2;  
    cout << "Enter Details for First Student : " << endl;  
    obj1.getDetails();  
    cout << "Enter Details for Second Student : " << endl;  
    obj2.getDetails();  
    cout << "Details Entered are : " << endl;  
    obj1.printDetails();  
    obj2.printDetails();  
}
```

Output

```

File Edit Selection View Go Run Terminal Help
EXPLORER ... VS Code > Untitled1.cpp > main()
D: $RECYCLE.BIN Python VS Code C hello.c hello.exe Untitled1.cpp Untitled1.exe
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS D:\VS Code> cd "D:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { ./Untitled1 }
Enter Details for First Student :
Enter Name : Ayush
Enter RollNo: 20011148
Enter Phone Number: 123456789
Enter Address: Dehradun

Enter Details for Second Student :
Enter Name : Mohan
Enter RollNo: 2345671
Enter Phone Number: 987654321
Enter Address: Bihar

Details Entered are :
Name : Ayush
Roll No : 20011148
Phone No : 123456789
Address : Dehradun

Name : Mohan
Roll No : 2345671
Phone No : 987654321
Address : Bihar
PS D:\VS Code>

```

The screenshot shows the Visual Studio Code interface with the following details:

- File Bar:** File, Edit, Selection, View, Go, Run, Terminal, Help.
- Explorer:** Shows the file system with a tree view of files and folders.
- Terminal:** Displays the command-line output of a C++ program. The program prompts for student details (Name, RollNo, Phone Number, Address) and prints them back. It handles two entries: one for Ayush and one for Mohan.
- Status Bar:** Shows the current file path (D:\VS Code), terminal mode (In 36, Col 49), tab size (4), encoding (UTF-8), and other system information (24°C Haze, 02:56 PM, 25-11-2021).

Task1: Class and Object in C++

b. WAP which would contain array of objects [many objects], of a class Student. Student [Name, Age, Year, section, marks], the section would be A,B,C and D. Your program would be able to return the total marks of students in the college.

Hint [Make a Matrix or Tabular diagram to understand the problem], all the rows will differ each other by different objects of Student class [Student s1,s2,s3,s4].

Source Code :

```
#include<iostream>
#include <string>
using namespace std;

class Student{
public:
    string name;
    int age;
    int year;
    char sec;
    int marks;
    void printDetails()
    {
        cout << "Name : " <<name << endl << "Age : "<< age<< endl << "Year : "
        << year << endl << "Section : " <<sec<< endl<< "Marks : "<<marks<<endl<<endl;
    }
    void getDetails()
    {
    }
}
```

```

cout << "Enter Name : ";
cin >> name;

cout <<"Enter age : ";
cin >>age;

cout << "Enter Year : ";
cin >> year;

cout <<"Enter Section : ";
cin >>sec;

cout << "Enter Marks : ";
cin >> marks;

cout << endl;

}

};

int main()
{
    Student obj[5] ;

    for(int i=0 ;i < 4;i++)
    {
        cout << "Enter Details for Student No : "<<i+1 <<endl;
        obj[i].getDetails();
    }

    int TotalMarks=0;
    for(int i=0 ;i< 4;i++)
    {

```

```

TotalMarks += obj[i].marks;

}

cout << "Total Marks of Student in College are : " << TotalMarks << endl ;

}

```

Output

```

File Edit Selection View Go Run Terminal Help Untitled1.cpp - d: - Visual Studio Code

EXPLORER D: Get Started Untitled1.cpp X
VS Code > Untitled1.cpp > main()
43 int TotalMarks=0;
44 for(int i=0 ;i< 4;i++)
45 {
46     TotalMarks += obj[i].marks;
47 }
48 cout << "Total Marks of Student in College are : " << TotalMarks << endl ;
49 }

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS D:\VS Code> cd "D:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
Enter Details for Student No : 1
Enter Name : Ayush
Enter age : 18
Enter Year : 2021
Enter Section : C
Enter Marks : 98

Enter Details for Student No : 2
Enter Name : Mohan
Enter age : 20
Enter Year : 2021
Enter Section : C
Enter Marks : 96

Enter Details for Student No : 3
Enter Name : Gaurav
Enter age : 20
Enter Year : 2021
Enter Section : A
Enter Marks : 87

Enter Details for Student No : 4
Enter Name : Shyan
Enter age : 19
Enter Year : 2021
Enter Section : B
Enter Marks : 98

Total Marks of Student in College are : 371
PS D:\VS Code>

```

Type here to search 20 24°C Haze 242 PM ENG 25-11-2021

Task2: Constructor in C++

WAP to create a class to print the area of a square and a rectangle. The class has two functions with the same name but different number of parameters. The function for printing the area of rectangle has two parameters which are its length and breadth respectively while the other function for printing the area of square has one parameter which is the side of the square. Use multiple constructors to for the initialization.

Source Code :

```
#include<iostream>
#include <string>
using namespace std;

class Area{
public:
float area;

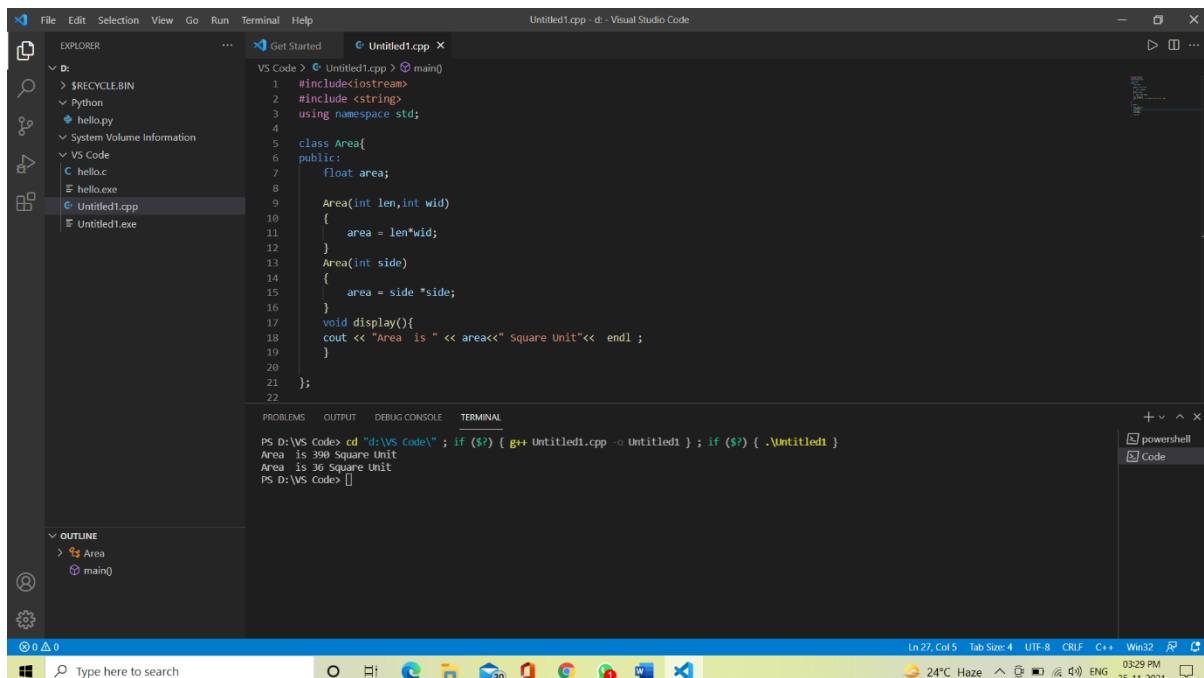
Area(int len,int wid)
{
area = len*wid;
}
Area(int side)
{
area = side *side;
}
void display(){
cout << "Area is " << area << " Square Unit" << endl ;
}
};

int main()
{
Area r(30 ,13);
r.display();

Area s(6);
s.display();

return 0;
}
```

Output



```

File Edit Selection View Go Run Terminal Help
EXPLORER ... Untitled1.cpp x
VS Code > Untitled1.cpp > main()
1 #include<iostream>
2 #include <string>
3 using namespace std;
4
5 class Area{
6 public:
7     float area;
8
9     Area(int len,int wid)
10    {
11         area = len*wid;
12    }
13    Area(int side)
14    {
15        area = side *side;
16    }
17    void display(){
18        cout << "Area is " << area<< " Square Unit" << endl ;
19    }
20
21 };
22
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
Area is 399 Square Unit
Area is 36 Square Unit
PS D:\VS Code> []

```

The screenshot shows the Visual Studio Code interface with the following details:

- File Menu:** File, Edit, Selection, View, Go, Run, Terminal, Help.
- Explorer:** Shows the file structure with a tree view of the workspace. Files listed include \$RECYCLE.BIN, Python, hello.py, System Volume Information, VS Code, hello.c, hello.exe, Untitled1.cpp, and Untitled1.exe.
- Code Editor:** The main window displays the C++ code for the Area class. The code includes two constructors (one for rectangle and one for square) and a display method.
- Terminal:** The bottom panel shows a terminal window with the command `cd "d:\VS Code\" ; if (\$?) { g++ Untitled1.cpp -o Untitled1 } ; if (\$?) { .\Untitled1 }` and its output: "Area is 399 Square Unit" and "Area is 36 Square Unit".
- Bottom Bar:** Includes a search bar, taskbar icons (Windows, Task View, File Explorer, Task Scheduler, Task Manager, Start, Edge, File Explorer, Task View, Task Manager, Task View, Task Manager), and system status indicators (24°C Haze, ENG, 03:29 PM, 25-11-2021).

Task3: Static Data Members in C++

WAP to count the total number of calls for a member function from more than one objects. [Lets say, from 3 such Objects]

Source Code :

```
#include <iostream>

using namespace std;

class A

{
public:
    A() { cout << "A's constructor called " << endl; }

};

class B :public A

{
public:
    B()
    { cout << "B's constructor called " << endl; }

};

class C: public B

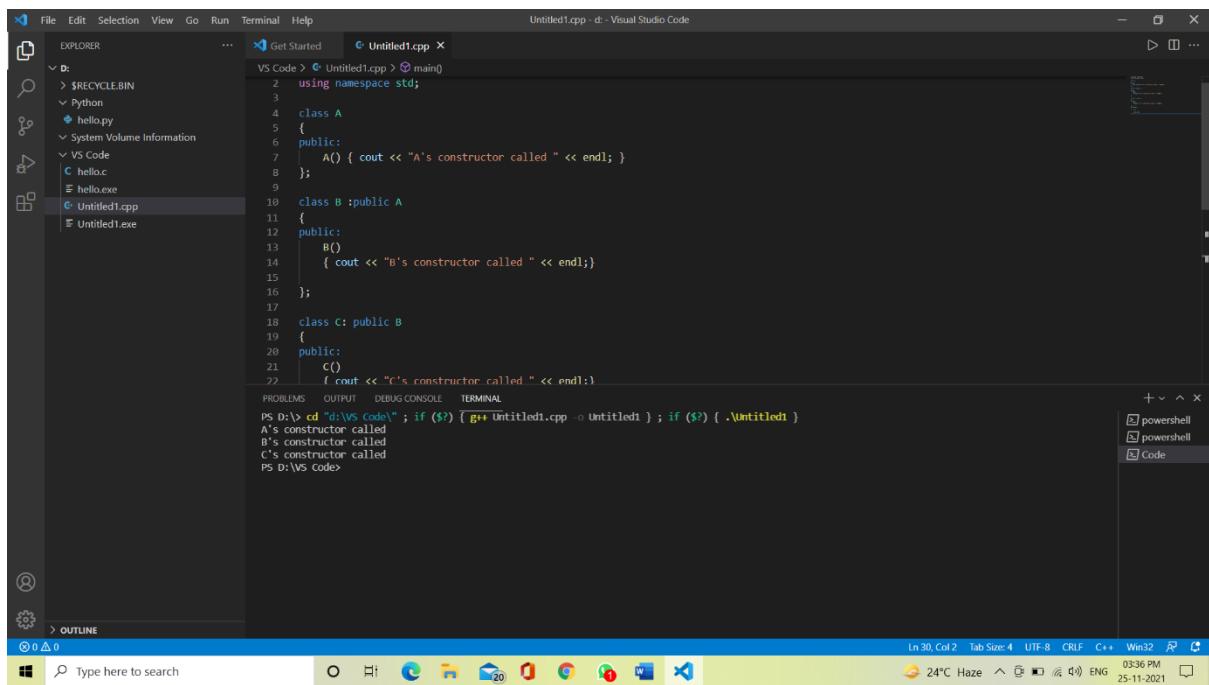
{
public:
    C()
    { cout << "C's constructor called " << endl; }

};

int main()
```

```
{
    C c;
    return 0;
}
```

Output



The screenshot shows the Visual Studio Code interface. The code editor displays the following C++ code:

```

1 using namespace std;
2
3 class A
4 {
5     public:
6         A() { cout << "A's constructor called " << endl; }
7 }
8
9 class B : public A
10 {
11     public:
12         B()
13         { cout << "B's constructor called " << endl; }
14 }
15
16 class C : public B
17 {
18     public:
19         C()
20         { cout << "C's constructor called " << endl; }
21 }
22

```

The terminal window at the bottom shows the command line output:

```

PS D:\> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 ; if ($?) { .\Untitled1 } }
A's constructor called
B's constructor called
C's constructor called
PS D:\VS Code>

```

Task4: Friend Function in C++

WAP in which you create a Student class having basic information for each student, like name, age and marks. By using friend function add marks of all the students [lets say 3 objects] and print it.

Source Code :

```
#include<iostream>
using namespace std;

class Students{
    string name;
    int age;
    int marks;

public:
    void getDetails()
    {
        cout << "Enter Name : ";
        cin >> name;
        cout << "Enter age : ";
        cin >> age;
        cout << "Enter Marks : ";
        cin >> marks;
        cout << endl;
    }

    friend int sum(Students);
};

int sum (Students s)
{
    return s.marks;
}

int main()
{
    Students obj[3] ;
    for(int i = 0; i < 3; i++)

```

```
{  
cout << "Enter Details for Student No. "<<i+1 <<endl;  
obj[i].getDetails();  
}  
int TotalMarks=0;  
for(int i = 0; i < 3; i++)  
{  
TotalMarks += sum(obj[i]);  
}  
cout << "Total Marks of Student are : " << TotalMarks<<endl ;  
}
```

Output

```

VS Code > Untitled1.cpp > Students > getDetails()
1 #include<iostream>
2 using namespace std;
3
4 class Students{
5     string name;
6     int age;
7     int marks;
8
9 public:
10    void getDetails()
11    {
12        cout << "Enter Name : ";
13        cin >> name;
14        cout << "Enter age : ";
15        cin >> age;
16        cout << "Enter Marks : ";
17        cin >> marks;
18    }
19
20    int calculateTotalMarks()
21    {
22        return name + age + marks;
23    }
24
25 };
26
27 int main()
28 {
29     Students s1;
30     s1.getDetails();
31     cout << "Total Marks of Student are : " << s1.calculateTotalMarks();
32     return 0;
33 }

PS D:\VS Code> cd "D:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
Enter Details for Student No. 1
Enter Name : Ayush
Enter age : 18
Enter Marks : 97

Enter Details for Student No. 2
Enter Name : Mohan
Enter age : 18
Enter Marks : 95

Enter Details for Student No. 3
Enter Name : Gaurav
Enter age : 19
Enter Marks : 89

Total Marks of Student are : 281
PS D:\VS Code>

```

Task5: Structure in C++

WAP to create a College class and Student Structure in C++ in one program. By providing such suitable examples write at least 5 differences between class and struct code you have written above.

Hint [Access Specifiers, Heap and Stack, large and small memory, etc.]

Source Code :

```
#include<iostream>
using namespace std;

class College{
string name;
public:
static int strength ;

char sec;
};

int College ::strength = 300;

class College2 : public College{
public:
College2() {cout << "Constructor called" << endl;
cout << "All properties are inherited because class support inheritance" << endl;}
};

struct student{
int strength = 300;
string name;
char sec;
};

int main()
{
College c;
struct student s;
College2 d;

s.name = "Alex";
c.name = "Manan";
return 0;
}
```

Output

The screenshot shows the Visual Studio Code interface with the following details:

- File Explorer:** Shows files in the current workspace, including `hello.py`, `VS Code`, `hello.c`, `hello.exe`, and the active file `Untitled1.cpp`.
- Code Editor:** Displays the following C++ code:

```

15     };
16
17     int College ::strength = 300;           // variable can be initialized during the declaration
18
19     class collegez : public college{        // class can also be inherited.
20     public:
21         collegez() {cout << "constructor called" << endl;
22             cout << "All properties are inherited because class support inheritance" << endl;};
23             //to initialize the member of a class, the constructors and destructors are used
24     };
25
26     struct student{
27         int strength = 300;                  // variables in the structure can not be initialized during the declaration
28         string name;
29         char sec;
30     };
31
32     int main()
33     {
34         cout << "Hello World" << endl;
35     }

```
- Terminal:** Shows the command line output from the terminal tab:

```

PS D:\VS Code> cd "D:\VS Code" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { ./Untitled1 }
Untitled1.cpp:2:18: warning: non-static data member initializers only available with -std=c++11 or -std=gnu++11
int strength = 300;          // variables in the structure can not be initialized during the declaration
                           ^
Untitled1.cpp: In function 'int main()':
Untitled1.cpp:11:9: error: 'std::string College::name' is private
    string name;           //private variable name
                           ^
Untitled1.cpp:39:4: error: within this context
    c.name = "Manan";      //compiler error because name is private
                           ^
PS D:\VS Code>

```
- Bottom Status Bar:** Displays file path (`D:\VS Code`), line (Ln 42), column (Col 1), tab size (Tab Size 4), encoding (UTF-8), file type (C++), window title (Untitled1.cpp - d - Visual Studio Code), and system information (Windows 10, 23°C Haze, 03:51 PM, 25-11-2021).

Practical No. 10

Q. Write C++ code for below mentioned tasks?

Array of Objects, Pointer to Object, This pointer, Operator Overloading in C++

Task1: Array of Objects in C++

WAP to create a directory that contains the following information.

- (a) Name of a person
- (b) Address
- (c) Telephone Number (if available with STD code)
- (d) Mobile Number (if available)
- (e) Head of the family

Source Code :

```
#include<iostream>

using namespace std ;

class Details{

public :

    string Name;

    string Address;

    unsigned long Telephone ;

    unsigned long Mobile;

    string Head ;

    void getDetails()

    {

        cout << "Enter Name : ";

        cin >> Name;
    }
}
```

```

cout << "Enter Address : ";
cin >> Address;

cout << "Enter Telephone Number (if available with STD code) : ";
cin >> Telephone ;

cout << "Enter Mobile Number (if available) : ";
cin >> Mobile;

cout << "Name of Head of the Family : ";
cin >> Head;

cout << endl;

}

void printDetails(){

cout << "Name of Person : " << Name<<endl << "Address : " << Address << endl
<< "Telephone Number : " << Telephone << endl ;

cout << "Mobile Number : " << endl << "Head of Family : " << Head << endl <<
endl;

}

};

int main()

{
    Details D[3];

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

    {

        cout << "Enter Details for Person No. "<<i+1 <<endl;
        D[i].getDetails();

    }
}

```

```
string checker;  
cout << "Enter Name of the head of family to get data : ";  
cin >> checker;  
for(int i=0;i< 3 ;i++)  
{  
    string s = D[i].Head;  
    if(!(s.compare(checker)))  
        D[i].printDetails();  
}  
return 0;  
}
```

Output

```

File Edit Selection View Go Run Terminal Help
EXPLORER Untitled1.cpp ...
VS Code > Untitled1.cpp > Details > printDetails()
44     string checker;
45     cout << "Enter Name of the head of family to get data : ";
46     cin >> checker;
47     for(int i=0;i< 3 ;i++)
48     {
49         string s = D[i].Head;
50         if((s.compare(checker)))
51             if(!D[i].printDetails());
52     }
53 }

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS D:\VS Code> cd "d:\VS Code" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
Enter Details for Person No. 1
Enter Name : Ayush
Enter Address : Dehradun
Enter Telephone Number (if available with STD code) : 123456
Enter Mobile Number (if available) : 9865345666
Name of Head of the Family : Ayush

Enter Details for Person No. 2
Enter Name : Mohan
Enter Address : Delhi
Enter Telephone Number (if available with STD code) : 23456
Enter Mobile Number (if available) : 9376364447
Name of Head of the Family :
Enter Details for Person No. 3
Enter Name : Gaurav
Enter Address : Bombay
Enter Telephone Number (if available with STD code) : 8665545
Enter Mobile Number (if available) : 9273764447
Name of Head of the Family :
Enter Name of the head of family to get data : Name of Person : Gaurav
Address : Bombay
Telephone Number : 8665545
Mobile Number :
Head of Family :

PS D:\VS Code>

```

The screenshot shows the Visual Studio Code interface with the 'Terminal' tab active. The terminal window displays the execution of a C++ program named 'Untitled1'. It prompts for details for three persons, including name, address, telephone number, and mobile number. It also asks for the name of the head of the family to get data for that person. The program then prints the details for the specified person.

Task2: Pointer to Object in C++

WAP to create print or display Student information containing in Student class by using pointers to object.

Source Code :

```
#include<iostream>
#include <string>
using namespace std;

class Student{
public:
    string name;
    int age;
    char sec;
    int marks;
    void printDetails()
    {
        cout << "Name : " <<name << endl << "Age : "<< age<< endl << "Section : "
        <<sec<< endl<< "Marks : "<<marks<<endl<<endl;
    }
    void getDetails()
    {
        cout << "Enter Name : ";
        cin >> name;
        cout <<"Enter age : ";
        cin >>age;
    }
}
```

```

cout << "Enter Section : ";
cin >> sec;

cout << "Enter Marks : ";
cin >> marks;

cout << endl;

}

};

int main()
{
    Student obj;

    cout << "Enter Details of Student : " << endl;
    obj.getDetails();

    Student * ptr;
    ptr = &obj;

    cout << "Details of Student are : " << endl ;
    ptr->printDetails();
}

```

Output

The screenshot shows the Visual Studio Code interface with the following details:

- File Explorer:** Shows a tree view of the project structure under 'D:\'. The 'VS Code' folder contains 'Untitled1.cpp' and 'Untitled1.exe'. Other folders like '.vscode', '\$RECYCLE.BIN', 'Python', and 'System Volume Information' are also listed.
- Code Editor:** The main editor window displays the content of 'Untitled1.cpp'. The code defines a 'Student' class with a constructor, a method 'getDetails()', and a pointer 'ptr' pointing to an object of type 'Student'. It then prints the student's details using the 'printDetails()' method.
- Terminal:** The terminal window at the bottom shows the output of running the program in PowerShell. It prompts for student details (Name, Age, Section, Marks) and then prints them back.
- Status Bar:** The status bar at the bottom right shows the file path 'D:\VS Code> Untitled1.cpp', the tab count '4', the encoding 'UTF-8', and the date/time '04/27 PM 25-11-2021'.

Task3: This pointer in C++

WAP to pass two variables in a parameterized constructor during object creation and have same names variables as class member data and constructor parameters. Your job is to calculate the remainder of those two numbers.

Source Code :

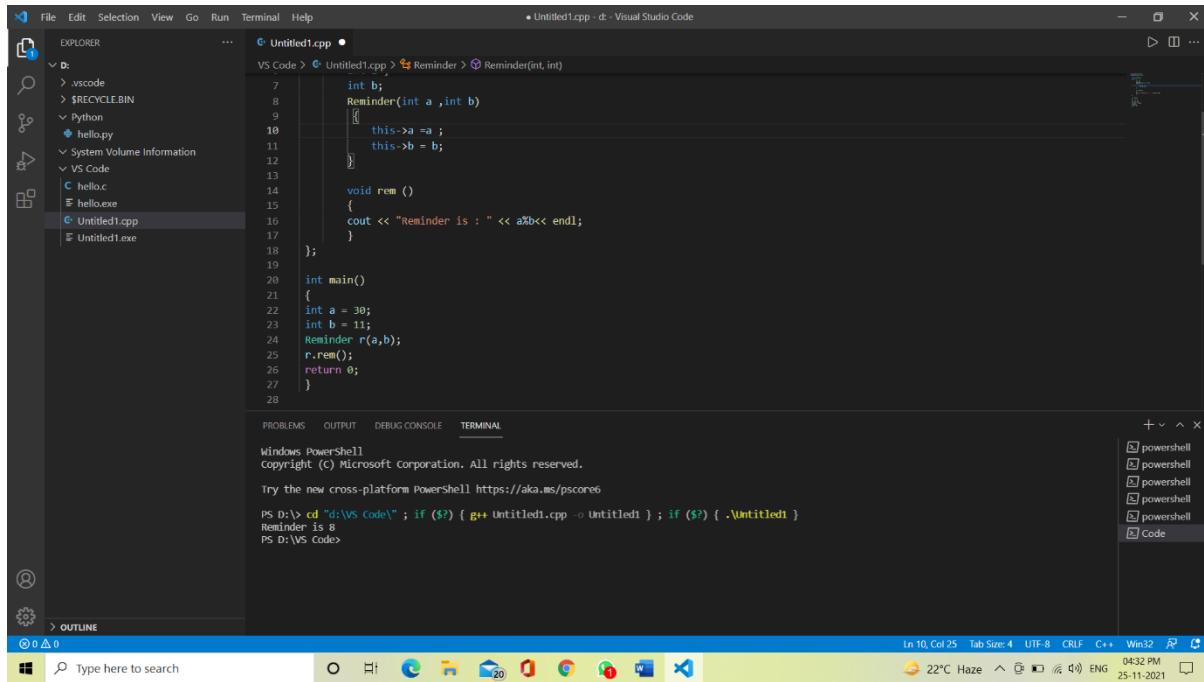
```
#include<iostream>
using namespace std ;

class Reminder{
public :
int a ;
int b;
Reminder(int a ,int b)
{
this->a =a ;
this->b = b;
}

void rem ()
{
cout << "Reminder is : " << a%b<< endl;
}
};

int main()
{
int a = 30;
int b = 11;
Reminder r(a,b);
r.rem();
return 0;
}
```

Output



```

File Edit Selection View Go Run Terminal Help • Untitled1.cpp - d - Visual Studio Code
EXPLORER VS Code > Untitled1.cpp > Reminder > Reminder(int, int)
7     int b;
8     Reminder(int a, int b)
9     {
10         this->a = a;
11         this->b = b;
12     }
13
14     void rem()
15     {
16         cout << "Reminder is : " << a % b << endl;
17     }
18 }
19
20 int main()
21 {
22     int a = 30;
23     int b = 11;
24     Reminder r(a,b);
25     r.rem();
26     return 0;
27 }
28

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Windows PowerShell
copyright (C) Microsoft Corporation. All rights reserved.
Try the new cross-platform PowerShell <https://aka.ms/powershell>
PS D:\> cd "d:\VS Code\" ; if (\$?) { g++ Untitled1.cpp -o Untitled1 ; if (\$?) { .\Untitled1 }
Reminder is 8
PS D:\VS Code>

In 10, Col 25 Tab Size: 4 UTF-8 CRLF C++ Wm32 R L
22°C Haze ^ ⌂ ⌂ ENG 04:32 PM 25-11-2021

Task4: Operator Overloading in C++

a). WAP, in which you write a friend function to overload a less than '<' operator in C++.

Source Code :

```
#include<iostream>
#include<string.h>

using namespace std;

class A{
string s ;
public:

A(string x)
{
this->s = x;
}

friend int operator < (A b, A a);
};

int operator < (A b, A a)
{
if((a.s).length() == (b.s).length());
    return 1;
else
    return 0;
}

int main()
{
A a("Ayush") , b("Dehradun");

if(a < b)
    cout<< "String are equal."<<endl;
else
    cout<< "String are not equal."<<endl;

}
```

Output

The screenshot shows the Visual Studio Code interface. The main area displays a C++ file named Untitled1.cpp. The code compares two strings, 'Ayush' and 'Dehradun', using operator overloading for the less than operator (<). The terminal below shows the execution of the code in a PowerShell window, resulting in the output "String are not equal."

```

File Edit Selection View Go Run Terminal Help
EXPLORER D: .vscode $RECYCLE.BIN Python VS Code VS Code hello.c hello.exe Untitled1.cpp Untitled1.exe
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS D:\> cd "d:\VS Code\" ; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; if ($?) { .\Untitled1 }
String are not equal.
PS D:\VS Code>

```

Task4: Operator Overloading in C++

b). WAP in which you can add two objects [every object would have 1 integer value] by overloading + operator, which eventually would add the data values of those two object by adding the objects.

Source Code :

```
#include<iostream>
using namespace std;

class abc
{
private:
int num;
public:
abc(int x)
{
this->num=x;
}

void operator +(abc obj)
{
cout << "After adding two objects sum is : ";
cout << num+obj.num;
}

int main()
{
abc obj(30);
abc obj1(50);
obj+obj1;
return 0;
}
```

Output

The screenshot shows the Visual Studio Code interface. The Explorer sidebar on the left lists files and folders. The main editor area displays the following C++ code:

```

private:
    int num;
public:
    abc(int x)
    {
        this->num=x;
    }

    void operator +(abc obj)
    {
        cout <<"After adding two objects sum is : ";
        cout<<num+obj.num;
    }

int main()
{
    abc obj(30);
    abc obj1(50);
    obj+obj1;
    return 0;
}

```

The terminal at the bottom shows the command line output:

```

PS D:\VS Code> cd "d:\VS Code\"; if ($?) { g++ Untitled1.cpp -o Untitled1 } ; If ($?) { .\Untitled1 }
After adding two objects sum is :
80
PS D:\VS Code> []

```

The status bar at the bottom right indicates the file is in line 17, column 26, with tab size 4, UTF-8 encoding, and C++ language selected.

Practical No. 11

Q. Write C++ code for below mentioned tasks?

Task-11.1 Inheritance Basics:

WAP in C++ to create a Parent and Child interaction using inheritance.

With this Parent and Child Interaction try to perform these tasks:

- a. Call Parent class method in child class function without creating an object of parent class
- b. Call Parent class method in main method by child class object.

Source Code :

```
#include<iostream>
using namespace std;
class Parent
{
public:
    int x;
    void display()
    {
        x = 100;
        cout << x << endl;
    }
};

class Child: public Parent
{
public:
    void displayChild()
    {
        x = 5;
        cout << x << endl;
        display();
    }
};

int main()
{
    Child obj;
    obj.displayChild();
    return 0;
}
```

Output

The screenshot shows the Visual Studio Code interface. In the top-left, there are two tabs: 'Untitled1.cpp' and 'Codes.cpp'. The 'Codes.cpp' tab is active, displaying the following C++ code:

```
D:\> VS Code > Codes.cpp ...
1 #include<iostream>
2 using namespace std;
3 class Parent
4 {
5     public:
6         int x;
7         void display()
8         {
9             x=100;
10            cout <<x <<endl;
11        }
12    };
13 class Child: public Parent
14 {
15 }
```

Below the code editor, the terminal window shows the command and its output:

```
PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Codes.cpp -o codes } ; if ($?) { .\codes }
5
100
PS D:\VS Code>
```

The bottom status bar indicates the file is at 'Ln 1, Col 1' with 'Spaces: 4', 'UTF-8', 'CRLF', 'C++', 'Win32', and the current date and time '19-12-2021'.

Task-11.2 Multiple Inheritance in C++:

Create two classes named Mammals and MarineAnimals. Create another class named BlueWhale which inherits both the above classes. Now, create a function in each of these classes which prints "I am mammal", "I am a marine animal" and "I belong to both the categories: Mammals as well as Marine Animals" respectively. Now, create an object for each of the above class and try calling

- 1 - function of Mammals by the object of Mammal**
- 2 - function of MarineAnimal by the object of MarineAnimal**
- 3 - function of BlueWhale by the object of BlueWhale**
- 3 - function of each of its parent by the object of BlueWhale**

Source Code :

```
#include<iostream>
using namespace std;

class Mammals
{
public:
void displayMammals()
{
    cout<<"I am Mammal"<<endl;
}
};

class MarineAnimals
{
public:
void displayMarine()
{
    cout<<"I am a Marine Animal"<<endl;
}
};

class BlueWhale : public Mammals, public MarineAnimals
{
public:
void displayBoth()
{
    cout<<"I belong to both the categories : Mammals as well as Marine Animals"<<endl;
}
};
```

```
};
```

```
int main()
{
Mammals A;
MarineAnimals B;
BlueWhale C;
A.displayMammals();
B.displayMarine();
C.displayBoth();
C.displayMammals();
C.displayMarine();
return 0;
}
```

Output

The screenshot shows the Visual Studio Code interface. In the top left, there are two tabs: 'Untitled1.cpp' and 'Codes.cpp'. The 'Codes.cpp' tab is active, displaying the following C++ code:

```

D: > VS Code > Codes.cpp > main()
1 #include<iostream>
2 using namespace std;
3
4 class Mammals
5 {
6 public:
7     void displayMammals()
8     {
9         cout<<"I am Mammal"<<endl;
10    }
11 }
12
13 class MarineAnimals
14 {
15 public:

```

Below the code editor, the 'TERMINAL' tab is selected, showing the following command-line output:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ codes.cpp -o Codes } ; if ($?) { .\Codes }
I am Mammal
I am a Marine Animal
I belong to both the categories : Mammals as well as Marine Animals
I am Mammal
I am a Marine Animal
PS D:\VS Code>

```

The status bar at the bottom right indicates the file is 'Ln 42, Col 2' with 'Spaces: 4', 'UTF-8', 'CRLF', 'C++', 'Wm32', and a timestamp of '01:04 PM 19-12-2021'.

Task-11.3 Dimond Problem in multiple inheritance using C++:

- a. WAP to illustrate Dimond Problem in multiple inheritance.

Source Code :

//a. WAP to illustrate Diamond Problem in Multiple Inheritance.

```
#include <bits/stdc++.h>
using namespace std;

class A {
public:
int k;
void display()
{
cout << "This is display method from Base class A" << endl;
}
};

class B : public A{
public:
void display1()
{
cout << "This is display1 method from class B" << endl;
}
};

class C : public A{
public:
void display2()
{
cout << "This is display2 method from class C" << endl;
}
};

class D : public B, public C{
public:
void display3()
{
cout << "This is display3 method from class D" << endl;
}
};

int main()
{
D d;
d.display1();
d.display2();
d.display3();
d.k = 10;
return 0; }
```

Output

The screenshot shows a Linux desktop environment with a terminal window open. The terminal window has a dark blue background and contains the following code and its compilation output:

```

Terminal Terminal File Edit View Search Terminal Help
Open ▾ [New]
1 #include <bits/stdc++.h>
2 using namespace std;
3
4 class A {
5     public:
6         int k;
7         void display()
8     {
9         cout << "This is display method from Base class A" << endl;
10    }
11};
12
13 class B : public A{
14     public:
15         void display1()
16     {
17         cout << "This is display1 method from class B" << endl;
18    }
19};
20
21 class C : public A{
22     public:
23         void display2()
24     {
25         cout << "This is display2 method from class C" << endl;
26    }
27};
28
29 class D : public B, public C{
30     //contains two display() functions, how?
31     public:
32         void display3()
33     {
34         cout << "This is display3 method from class D" << endl;
35    }
36};
37
38 int main(){
39     D d;
40 }
```

The terminal output window shows the command `g++ practical_11.cpp` being run, followed by an error message:

```

Terminal
gehu@lab7-pc10:~/Untitled Folder 2$ g++ practical_11.cpp
practical_11.cpp: In function 'int main()':
practical_11.cpp:45:7: error: request for member 'k' is ambiguous
        d.k = 10;
          ^
practical_11.cpp:6:9: note: candidates are: int A::k
        int k;
          ^
practical_11.cpp:6:9: note:                     int A::k
gehu@lab7-pc10:~/Untitled Folder 2$ _
```

- Task-11.3 Dimond Problem in multiple inheritance using C++:**
- its solution using Virtual base classes. Write separate programs if required.**

Source Code :

```
#include <bits/stdc++.h>
using namespace std;

class A {
public:
int k;
void display()
{
cout << "\nThis is display method from Base class A" << endl;
cout << "The value of k is : " << k << " in class A" << endl;
}
};

class B : virtual public A{
public:
void display1()
{
cout << "This is display1 method from class B" << endl;
}
};

class C : virtual public A{
public:
void display2()
{
cout << "This is display2 method from class C" << endl;
}
};

class D : public B, public C{
public:
void display3()
{
cout << "\nThis is display3 method from class D" << endl;
cout << "The value of k is : " << k << " in class D" << endl;
}
};

int main()
{
D d;
d.display1();
d.display2();
d.display3();
d.k = 10;
}
```

```
d.display();
return 0;
}
```

Output

```

Terminal Terminal File Edit View Search Terminal Help
Open ▾ Save
5     public:
6     int k;
7     void display()
8     {
9         cout << "\nThis is display method from Base class A" <<
10        cout << "The value of k is : " << k << " in class A" <<
11    }
12 };
13
14 class B : virtual public A{
15     public:
16     void display1()
17     {
18         cout << "This is display1 method from class B" << endl;
19     }
20 };
21
22 class C : virtual public A{
23     public:
24     void display2()
25     {
26         cout << "This is display2 method from class C" << endl;
27     }
28 };
29
30 class D : public B, public C{
31     //contains two display() functions, how?
32     public:
33     void display3()
34     {
35         cout << "\nThis is display3 method from class D" << endl;
36         cout << "The value of k is : " << k << " in class D" << endl;
37     }
38 };
39
40 int main(){
41
42     D d;
43     d.display1();
44     d.display2();

```

gehu@lab7-pc10:~/Untitled Folder 2\$ g++ A1.cpp
gehu@lab7-pc10:~/Untitled Folder 2\$./a.out
This is display method from class B
This is display2 method from class C
This is display3 method from class D
The value of k is : 437534096 in class D
This is display method from Base class A
The value of k is : 10 in class A
gehu@lab7-pc10:~/Untitled Folder 2\$ _

C++ ▾ Tab Width: 4 ▾ Ln 51, Col 1 ▾ INS

Task-11.3 Dimond Problem in multiple inheritance using C++:

c. What else multiple inheritance can cause in a program, explain it by providing proper solution.

Source Code :

```
#include <bits/stdc++.h>
using namespace std;
class A {
public:
int k;
void display()
{
cout << "\nThis is display method from Base class A" << endl;
cout << "The value of k is : " << k << " in class A" << endl;
}
};

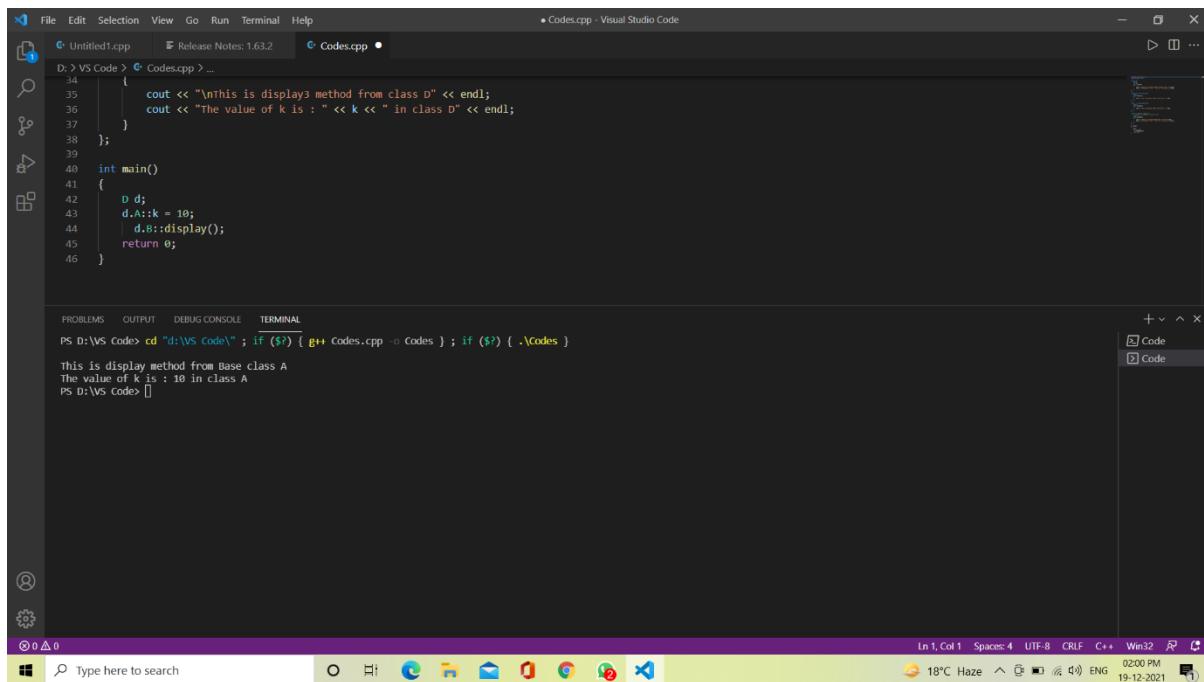
class B : virtual public A{
public:
void display1()
{
cout << "This is display1 method from class B" << endl;
}
};

class C : virtual public A{
public:
void display2()
{
cout << "This is display2 method from class C" << endl;
}
};

class D : public B, public C{
public:
void display3()
{
cout << "\nThis is display3 method from class D" << endl;
cout << "The value of k is : " << k << " in class D" << endl;
}
};
```

```
int main()
{
    D d;
    d.A::k = 10;
    d.B::display();
    return 0;
}
```

Output



The screenshot shows the Visual Studio Code interface with the following details:

- File Bar:** File, Edits, Selection, View, Go, Run, Terminal, Help.
- Editor:** Two tabs are open: Untitled1.cpp and Codes.cpp. The Untitled1.cpp tab contains the provided C++ code. The Codes.cpp tab shows the terminal output of the program's execution.
- Terminal Output:**

```
D:\VS Code> cd "d:\VS Code\" ; If ($?) { g++ Codes.cpp -o Codes } ; If ($?) { .\Codes }
This is display method from Base class A
The value of k is : 10 in class A
PS D:\VS Code> []
```
- Status Bar:** Shows file path (Untitled1.cpp), line 1, column 1, spaces: 4, encoding (UTF-8), C++, Win32, and current date/time (19-12-2021, 02:00 PM).

Practical No. 12

Q. Write C++ code for below mentioned tasks?

Task-12.1 WAP to illustrate the role of Access Modifiers [private, public, protected] separately in:

- a. Accessing base class elements in derived class or Inheritance
- b. Accessing base class elements through object

Source Code :

```
#include<iostream>
using namespace std;
class A
{
    private :
        int y;
    protected :
        int z;
    public :
        int x;
        void display()
        {
            cout << "x = " <<x<< endl;
            cout << "z = " <<z<< endl;
        }
};
class B: public A {
public:
    void display()
    {
        z = 10;
        cout << "z = " <<z<< endl;
    }
};
class C: protected A{
public:
    void display()
    {
        x= 100;
        z= 50;
        cout << "x = " <<x<< endl;
        cout << "z = " <<z<< endl;
    }
};
```

```
    }
};

class D : public C{};

int main()
{
    B objB;
    C objC;
    D objD;
    objB.display();
    objC.display();
}
```

Output

The screenshot shows the Visual Studio Code interface. In the top left, there are two tabs: "Untitled1.cpp" and "Codes.cpp". The "Codes.cpp" tab is active, showing the following C++ code:

```

D: > VS Code > Codes.cpp > C > display()
1 #include<iostream>
2 using namespace std;
3
4 class A {
5     private :
6         int y;
7     protected :
8         int z;
9     public :
10    int x;
11    void display()
12    {
13        cout << "x = " <<x<< endl;
14        cout << "2 = " <<z<< endl;
```

```

Below the code editor is a terminal window titled "TERMINAL". It displays the following command-line session:

```

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\Ayush> cd "d:\VS Code\" ; if ($?) { g++ Codes.cpp -o Codes } ; if ($?) { ./Codes }

z = 10
x = 100
z = 50

PS D:\VS Code>

```

The status bar at the bottom of the screen shows the following information:

- Ln 33, Col 9
- Spaces: 4
- UTF-8
- CRLF
- C++
- Win32
- 12:01 PM
- 19-12-2021
- 15°C Haze
- ENGLISH

### **Task-12.2 Execution flow of Constructors and Destructors in C++:**

- a. WAP to illustrate the calling and execution flow of Constructors in inheritance. [L-2 Inheritance]
- b. WAP to illustrate the calling and execution flow of Destructors in inheritance. [L-2 Inheritance]
- c. Pass parameters to base class through derived class constructor. [L-1 Inheritance]

### **Source Code :**

```
#include<iostream>
using namespace std;
class A
{
public:
int k;
A(int y)
{
k = y;
}

~A()
{
cout<<"Destructor of class A"<<endl;
}

class B:public A
{
public:
int k;
B(int y):A(10)
{
this->k = y;
};

void showData1()
{
cout<<"class A :: k = "<<A::k<<endl;
cout<<"class B :: k = "<<this->k<<endl;
```

```

}

~B()
{
cout<<"Destructor of class B"<<endl;
}
};

class C:public B
{
public:
int r;
C(int y):B(20)
{
r=y;
};

void showData2()
{
showData1();
cout<<"class C :: r = "<<this->r<<endl;
}

~C()
{
cout<<"Destructor of class C"<<endl;
}
};

int main()
{
C obj(30);
obj.showData2();
cout<<"\nRunning destructors are : "<<endl;
}

```

## Output

The screenshot shows the Visual Studio Code interface. The left pane displays a C++ file named 'Codes.cpp' with the following code:

```

1 #include<iostream>
2 using namespace std;
3 class A
4 {
5 public:
6 int k;
7 A(int y)
8 {
9 k = y;
10 }
11 ~A()
12 {
13 cout<<"Destructor of class A"<<endl;
14 }
15 }
16 class B:public A
17 {
18 public:

```

The right pane shows a terminal window with the following output:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Codes.cpp -o codes } ; if ($?) { ./codes }
class A :: k = 7
class B :: k = 6
class C :: r = 5
Running destructors
Destructor of class C
Destructor of class B
Destructor of class A
PS D:\VS Code> []

```

The status bar at the bottom indicates the following information: Line 56, Column 14, Spaces: 4, UTF-8, CRLF, C++, Win32, 12:38 PM, 19-12-2021.

## Practical No. 13

**Q. Write C++ code for below mentioned tasks?**

**Task 13.1 To overload add method for two parameters with int and float data types in Base class. Along with it create a Derived class from the Base class named as child. The class child should override one of the overloaded method from base class.**

**Perform following tasks:**

1. Try calling overriding method from child class object.
2. Write name of the method which is not seen by the child class object.

### **Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 int add(int a, int b)
 {
 return a + b;
 }
 float add(float a, float b)
 {
 return a + b;
 }
 string add(char a, char b)
 {
 string sum;
 sum = sum + a;
 sum = sum + b;
 return sum;
 }
};
class child : public base
{
public:
```

```
int add(int a, int b)
{
 return a + b + 1;
}
};

int main()
{
 base obj1;
 child obj2;
 int ans1 = obj1.add(10, 20);
 int ans2 = obj2.add(10, 20);
 cout << "Overriding func called from base class gives SUM : " << ans1 << endl;
 cout << "Overriding fun called from child class gives SUM : " << ans2;
}
```

## Output

The screenshot shows a Visual Studio Code window with the following details:

- File Menu:** File, Edits, Selection, View, Go, Run, Terminal, Help.
- Editor Area:** Untitled2.cpp - Visual Studio Code. The code implements multiple inheritance and overrides a base class function.

```

20 return sum;
21 }
22 };
23 class child : public base
24 {
25 public:
26 int add(int a, int b)
27 {
28 return a + b + 1;
29 }
30 };
31 int main()
32 {
33 base obj1;
34 child obj2;
35 int ans1 = obj1.add(10, 20);
36 int ans2 = obj2.add(10, 20);
37 cout << "Overriding func called from base class gives SUM : " << ans1 << endl;
38 cout << "Overriding fun called from child class gives SUM : " << ans2;
39 }
```

- Terminal Output:**

```
PS D:\VS Code> cd "D:\VS Code\" ; IF ($?) { g++ Untitled2.cpp -o Untitled2 } ; IF ($?) { .\Untitled2 }
Overriding func called from base class gives SUM : 30
Overriding fun called from child class gives SUM : 31
PS D:\VS Code>
```
- Bottom Bar:** PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL.
- Status Bar:** Ln 39, Col 2, Spaces: 4, UTF-8, CRLF, C++, Win32, 11:29 AM, 10-01-2022.

**Q. Create two versions:**

**version 01: without 'using' keyword.**

## **Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 int add(int a, int b)
 {
 return a + b;
 }
 float add(float a, float b)
 {
 return a + b;
 }
 string add(char a, char b)
 {
 string sum;
 sum = sum + a;
 sum = sum + b;
 return sum;
 }
};

class child : public base
{
public:
 using base::add;
 int add(int a, int b)
 {
 return a + b + 1;
 }
};

int main()
{
 child obj2;
 int ans1 = obj2.add(10, 20);
 float ans2 = obj2.add(5.5f, 2.15f);
 string ans3 = obj2.add('a', 'b');
 cout << "With 'using' keyword : " << endl;
```

```

cout << ans1 << endl;
cout << ans2 << endl;
cout << ans3;
}

```

## Output

The screenshot shows the Visual Studio Code interface. The code editor displays the following C++ code:

```

File Edit Selection View Go Run Terminal Help
Untitled2.cpp - Visual Studio Code
D:\VS Code > Untitled2.cpp > main()
21 }
22 };
23 class child : public base
24 {
25 public:
26 using base::add;
27 int add(int a, int b)
28 {
29 return a + b + 1;
30 }
31 };
32 int main()
33 {
34 child obj2;
35 int ans1 = obj2.add(10, 20);
36 float ans2 = obj2.add(5.5f, 2.15f);
37 string ans3 = obj2.add("a", "b");
38 cout << "with 'using' keyword : " << endl;
39 cout << ans1 << endl;
40 cout << ans2 << endl;

```

The terminal below the code editor shows the output of the program:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
31
7.65
ab
PS D:\VS Code>

```

The status bar at the bottom right indicates the following information: Ln 34, Col 16, Spaces: 4, UTF-8, CRLF, C++, Win32, 11:35 AM, 10-01-2022.

**Create two versions:**

**version 02: with 'using' keyword**

## **Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 int add(int a, int b)
 {
 return a + b;
 }
 float add(float a, float b)
 {
 return a + b;
 }
 string add(char a, char b)
 {
 string sum;
 sum = sum + a;
 sum = sum + b;
 return sum;
 }
};

class child : public base
{
public:
 int add(int a, int b)
 {
 return a + b + 1;
 }
};

int main()
{
 child obj2;
 int ans1 = obj2.add(10, 20);
 float ans2 = obj2.add(5.5f, 2.15f);
 cout << "without 'using' keyword : " << endl;
 cout << ans1 << endl;
 cout << ans2;
}
```

## Output

File Edit Selection View Go Run Terminal Help

Untitled2.cpp - Visual Studio Code

```
D: > VS Code > Untitled2.cpp > main()
19 sum = sum + b;
20 }
21 }
22 }
23 class child : public base
24 {
public:
25 int add(int a, int b)
26 {
27 return a + b + 1;
28 }
29 }
30 }
31 int main()
32 {
33 child obj2;
34 int ans1 = obj2.add(10, 20);
35 float ans2 = obj2.add(5.5f, 2.15f);
36 cout << "without 'using' keyword : " << endl;
37 cout << ans1 << endl;
38 cout << ans2;
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

PS D:\VS Code> cd "d:\VS Code\" ; if (\$?) { g++ Untitled2.cpp -o Untitled2 } ; if (\$?) { ./Untitled2 }
without 'using' keyword :
31
8
PS D:\VS Code>

Ln 31, Col 11   Spaces: 4   UTF-8   CRLF   C++   Wm32

16°C Haze   ENG   11:43 AM   10-01-2022

**Task 13.2 Base class having a virtual and a pure virtual function.  
Derived class having same copy of virtual function with changed logic  
and definition of pure virtual function.**

**Perform following tasks:**

1. Try to call child class overriding method from base class pointer.

### **Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 virtual int add(int a, int b)
 {
 return a + b;
 }
 virtual int multi(int a, int b) = 0;
};

class child : public base
{
public:
 int add(int a, int b)
 {
 return a + b + 1;
 }
 int multi(int a, int b)
 {
 return a * b;
 }
};

int main()
{
 base *p;
 child c;
 p = &c;
 cout << p -> add(10, 20);
}
```

## Output

D:\> VS Code > Untitled2.cpp > ...

```
18 | return a + b + 1;
19 | }
20 | int multi(int a, int b)
21 | {
22 | return a * b;
23 | }
24 };
25 int main()
26 {
27 base *p;
28 child c;
29 p = &c;
30 cout << p -> add(10, 20);
31 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

PS D:\VS Code> cd "d:\VS Code\" ; if (\$?) { g++ Untitled2.cpp -o Untitled2 } ; if (\$?) { ./Untitled2 }

PS D:\VS Code>

**Perform following tasks:**

- 2. Try to call child class definition of pure virtual function in child class.**

**Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 virtual int add(int a, int b)
 {
 return a + b;
 }
 virtual int multi(int a, int b) = 0;
};

class child : public base
{
public:
 int add(int a, int b)
 {
 return a + b + 1;
 }
 int multi(int a, int b)
 {
 return a * b;
 }
};

int main()
{
 base *p;
 child c;
 p = &c;
 cout << p->multi(10, 20);
}
```

## Output

```

File Edit Selection View Go Run Terminal Help Untitled2.cpp - Visual Studio Code
D:\VS Code > Untitled2.cpp > main()
13 class child : public base
14 {
15 public:
16 int add(int a, int b) // during runtime this definition will be followed
17 {
18 return a + b + 1;
19 }
20 int multi(int a, int b)
21 {
22 return a * b;
23 }
24 };
25 int main()
26 {
27 base *p;
28 child c;
29 p = &c;
30 cout << p->multi(10, 20);
31 }

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
200
PS D:\VS Code>

```

Ln 31, Col 2 Spaces: 4 UTF-8 CRLF C++ Win32 ⚡

Type here to search

16°C Haze ⌂ ENG 11:51 AM 10-01-2022

**Perform following tasks:**

**3. Find out the abstraction in above implementation.**

## **Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 virtual int add(int a, int b)
 {
 return a + b;
 }
 virtual int multi(int a, int b) = 0;
};

class child : public base
{
public:
 int add(int a, int b)
 {
 return a + b + 1;
 }
 int multi(int a, int b)
 {
 return a * b;
 }
};

int main()
{
 base *p;
 child c;
 p = &c;
 cout << endl;
 cout << "Abstraction was in BASE CLASS in the Above implementation and not in the CHILD CLASS" << endl;
 cout << "because pure virtual function of base was defined in child class" << endl;
}
```

## Output

Untitled2.cpp - Visual Studio Code

File Edit Selection View Go Run Terminal Help

Untitled2.cpp X

D: > VS Code > Untitled2.cpp > main()

```
17 int add(int a, int b) // during runtime this definition will be followed
18 {
19 return a + b + 1;
20 }
21 int multi(int a, int b)
22 {
23 return a * b;
24 }
25 }
26 int main()
27 {
28 base *p;
29 child c;
30 p = &c;
31 cout << endl;
32 cout << "Abstraction was in BASE CLASS in the Above implementation and not in the CHILD CLASS" << endl;
33 cout << "because pure virtual function of base was defined in child class" << endl;
34 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

D: \VS Code> cd "d:\VS Code\" ; if (\$?) { g++ Untitled2.cpp -o Untitled2 } ; if (\$?) { .\Untitled2 }

Abstraction was in BASE CLASS in the Above implementation and not in the CHILD CLASS  
because pure virtual function of base was defined in child class

D: \VS Code>

Ln 34, Col 2 Spaces: 4 UTF-8 CRLF Win32

Type here to search

## Practical No. 14

**Task 14.1 Illustrate the compile time and run time binding using base class pointer, which holds the address of child class.**

### **Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 virtual int add(int a, int b)
 {
 return a + b;
 }
 int multi(int a, int b)
 {
 return a * b;
 }
};
class child : public base
{
public:
 int add(int a, int b)
 {
 return a + b + 1;
 }
 int multi(int a, int b)
 {
 return a / b;
 }
};
int main()
{
 base *p;
 child c;
 p = &c;
 cout << p->multi(10, 20) << " ";
 cout << p->add(15, 25);
}
```

## Output

```

File Edit Selection View Go Run Terminal Help
Untitled2.cpp - Visual Studio Code
D:\VS Code > Untitled2.cpp > main()
20 | {
21 | return a + b + 1;
22 |
23 | int multi(int a, int b)
24 | {
25 | return a / b;
26 | }
27 | };
28 | int main()
29 | {
30 | base *p;
31 | child c;
32 | p = &c;
33 | cout << p->multi(10, 20) << " "; // early binding (compile time binding)
34 | cout << p->add(15, 25); // late binding (run time binding)
35 |
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
200 41
PS D:\VS Code>

```

The screenshot shows the Visual Studio Code interface with a dark theme. A C++ file named `Untitled2.cpp` is open in the editor. The code contains a class `base` with methods `multi` and `add`, and a class `child` derived from `base`. The `multi` method is implemented in the header, while `add` is implemented in the body. The `main` function creates a `base` pointer pointing to a `child` object and prints the results of calling `multi` and `add` on it. The terminal at the bottom shows the command to compile the code and run the executable, followed by the output of the program.

**Task 14.2 Perform the following:**

1. Call base class destructor from base class pointer which is holding the child class object.

**Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 base()
 {
 cout << "Base Constructor" << endl;
 }
 ~base()
 {
 cout << "Base Destructor" << endl;
 }
};
class child : public base
{
public:
 child()
 {
 cout << "Class Constructor" << endl;
 }
 ~child()
 {
 cout << "Class Destructor" << endl;
 }
};
int main()
{
 base *p;
 child c;
 p = &c;
 delete p;
}
```

## Output

The screenshot shows the Visual Studio Code interface. The code editor window displays the following C++ code:

```

14 };
15 };
16 class child : public base
17 {
18 public:
19 child()
20 {
21 cout << "Class Constructor" << endl;
22 }
23 ~child()
24 {
25 cout << "Class Destructor" << endl;
26 }
27 };
28 int main()
29 {
30 base *p;
31 child c;
32 p = &c;
33 delete p; // BC CC BD

```

The terminal window below the code editor shows the output of the program:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
Base Constructor
Class Constructor
Base Destructor
Class Destructor
PS D:\VS Code>

```

The status bar at the bottom of the screen indicates the following information: In 25, Col 34, Spaces: 4, UTF-8, CRLF, C++, Win32, 11:14 AM, 10-01-2022.

**Task 14.2 Perform the following:**

- 2. Call child class destructor from base class pointer which is holding the child class object.**

**Source Code :**

```
#include <iostream>
#include <string>
using namespace std;
class base
{
public:
 base()
 {
 cout << "Base Constructor" << endl;
 }
 virtual ~base()
 {
 cout << "Base Destructor" << endl;
 }
};
class child : public base
{
public:
 child()
 {
 cout << "Class Constructor" << endl;
 }
 ~child()
 {
 cout << "Class Destructor" << endl;
 }
};

int main()
{
 base *p;
 child c;
 p = &c;
 delete p;
}
```

## Output

The screenshot shows a Visual Studio Code interface. The code editor window displays the following C++ code:

```

15 };
16 class child : public base
17 {
18 public:
19 child()
20 {
21 cout << "Class Constructor" << endl;
22 }
23 ~child()
24 {
25 cout << "Class Destructor" << endl;
26 }
27 };
28 int main()
29 {
30 base *p;
31 child c;
32 p = &c;
33 delete p;
34 }

```

The terminal window below the code editor shows the following output:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) (.\Untitled2)
Base Constructor
Class Constructor
Class Destructor
Base Destructor
Base Destructor
PS D:\VS Code>

```

The taskbar at the bottom of the screen includes icons for File Explorer, Task View, Edge browser, Mail, OneDrive, Microsoft Store, File Explorer, and Task View.

## Practical No. 15

**Q. Write C++ code for below mentioned tasks?**

**Task 15.1 WAP in C++ to read and write from and to a file using ifstream and ofstream.**

### **Source Code :**

```
#include<iostream>
#include<fstream>
#include<string>
using namespace std ;

int main()
{
 ofstream myfile;
 myfile.open("text.txt");
 myfile<< "this is the text written into the file";
 myfile.close();

 ifstream readfile;
 string data;
 readfile.open("text.txt");
 while(1)
 {
 readfile >>data;

 if(readfile.eof())
 {
 cout << data<<endl;
 break;
 }
 else
 cout << data<< " ";
 }
 readfile.close();
 return 0;
}
```

## Output

The screenshot shows a terminal window with two panes. The left pane displays a C++ program named 'Practical15Task1.cpp' containing code for reading from and writing to a file named 'text.txt'. The right pane shows the terminal output where the program is compiled with g++ and run, displaying the text 'this is the text written into the file'.

```
#include<iostream>
#include<fstream>
#include<string>
using namespace std ;
int main()
{
 ofstream myfile;
 myfile.open("text.txt");
 myfile<< "this is the text written into the file";
 myfile.close();
 ifstream readfile;
 string data;
 readfile.open("text.txt");
 while(1)
 {
 readfile >>data;
 if(readfile.eof()){
 cout << data<< endl;
 break;
 }
 else
 cout << data<< " ";
 }
 readfile.close();
 return 0;
}
```

Terminal  
gehu@lab7-pc7:~/Desktop/Practical15\$ g++ Practical15Task1.cpp  
gehu@lab7-pc7:~/Desktop/Practical15\$ ./a.out  
this is the text written into the file  
gehu@lab7-pc7:~/Desktop/Practical15\$

**Task 15.3 WAP in C++ for IO manipulators mentioned below:**

- a. **IOS:** hex,dec,skipws,noskipws
- b. **Istream:** ws
- c. **Ostream:** endl, ends, flush
- d. **Iomanip:** setW, setPrecision

**Source Code :**

```
#include<iostream>
#include<iomanip>
#include<sstream>
#include<string>
using namespace std ;

int main()
{
 int n =70;
 cout << hex << n << endl;
 cout << dec << n << endl;

 char a,b,c;
 stringstream s(" 123");
 s>>skipws>>a>>b>>c;
 cout << a << b << c << endl;

 stringstream p(" 123");
 p>>noskipws>>a>>b>>c;
 cout << a << b << c << endl;

 stringstream t(" this is a string");
 string line;
 getline(t >> ws,line);
 cout << line << endl;

 cout << "b" << ends; //ends

 int num = 45;
 cout << endl << setprecision(2) << num << endl

 int i = 18;
 cout << setw(10) << i;
}
```

## Output

The screenshot shows the Visual Studio Code interface. The code editor displays a file named Untitled2.cpp with the following content:

```

27 stringstream p(" 123");
28 p>>noskipws>>>b>>c; //noskipws
29 cout <<a <<<c <<<endl;
30
31 stringstream t(" this is a string");
32 string line;
33 getline(t >> ws, line); //ws
34 cout << line<<endl; //endl
35
36 cout << "b" << endl; //ends
37
38 int num = 45;
39 cout << endl << setprecision(2) << num << endl; //setprecision
40
41 int i = 18;
42 cout<<setw(10)<<i; //setw
43 }
44
45

```

The terminal below shows the execution of the code and its output:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if (?) { .\Untitled2 }

1
this is a string
b
45
 18
PS D:\VS Code>

```

The taskbar at the bottom includes icons for File Explorer, Task View, Edge, File Explorer, Microsoft Store, Microsoft Edge, Google Chrome, WhatsApp, and VS Code.

## Practical No. 16

**Q. Write C++ code for below mentioned tasks?**

**Task 16.1 WAP in C++ to create a generic add function for given tasks:**

- a. Perform add over two integers and return integer.

### **Source Code :**

```
#include<iostream>
using namespace std;

template <typename T>
T add(T x, T y)
{
 return x+y;
}

int main()
{
 int a ,b;
 cout << "Enter value of a and b : ";
 cin >> a >> b;
 cout << "Sum is : " << add<int>(a,b);
 return 0;
}
```

## Output

The screenshot shows the Visual Studio Code interface. The code editor displays a file named `Untitled2.cpp` with the following content:

```

1 /* WAP in C++ to create a genetic add function for given tasks:
2 | a. Perform add over two integers and return integer
3 */
4
5 #include<iostream>
6 using namespace std;
7 template <typename T>
8 T add(T x, T y)
9 {
10 return x+y;
11 }
12
13 int main()
14 {
15 int a ,b;
16 cout << "Enter value of a and b : ";
17 cin >> a >> b;
18 cout << "Sum is : " << add<int>(a,b);
19 return 0;
20 }

```

The terminal tab at the bottom shows the command-line output of the program:

```

D:\VS Code> cd "d:\VS Code" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
Enter value of a and b : 20 50
Sum is : 70
PS D:\VS Code>

```

The status bar at the bottom right indicates the following information: Ln 20, Col 2, Tab Size: 4, UTF-8, CRLF, C++, Win32, 09:52 PM, 09-01-2022, 14°C Cloudy, ENG.

**b. Perform add over one int and one float and return double.****Source Code :**

```
#include<iostream>
using namespace std;

template <typename T1, typename T2, typename T3>
T3 add(T1 x, T2 y)
{
 return x+y;
}

int main()
{
 int a ;
 float b ;
 cout << "Enter value of a and b : ";
 cin >> a >> b;
 cout << "Sum is : " << add<int, float , double>(a,b);
 return 0;
}
```

## Output

The screenshot shows a Visual Studio Code interface. The code editor window displays a file named 'Untitled2.cpp' with the following content:

```

1 #include<iostream>
2 using namespace std;
3 template <typename T1, typename T2, typename T3>
4 T3 add(T1 x, T2 y)
5 {
6 return x+y;
7 }
8
9 int main()
10 {
11 int a ;
12 float b ;
13 cout << "Enter value of a and b : ";
14 cin >> a >> b;
15 cout << "Sum is : " << add<int, float , double>(a,b);
16 return 0;
17 }

```

Below the code editor is a terminal window showing the execution of the program:

```

D:\VS Code > Untitled2.cpp > main()
1 #include<iostream>
2 using namespace std;
3 template <typename T1, typename T2, typename T3>
4 T3 add(T1 x, T2 y)
5 {
6 return x+y;
7 }
8
9 int main()
10 {
11 int a ;
12 float b ;
13 cout << "Enter value of a and b : ";
14 cin >> a >> b;
15 cout << "Sum is : " << add<int, float , double>(a,b);
16 return 0;
17 }

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
Enter value of a and b : 46 73.3737
Sum is : 119.374
PS D:\VS Code>

```

The status bar at the bottom indicates the current file is 'Untitled2.cpp', tab size is 4, encoding is UTF-8, and the system is Win32.

**Task 16.2 WAP in C++ to perform these tasks:**

- a. Catch a Divide by zero exception in  $z = x/y$  using "throw runtime\_error".

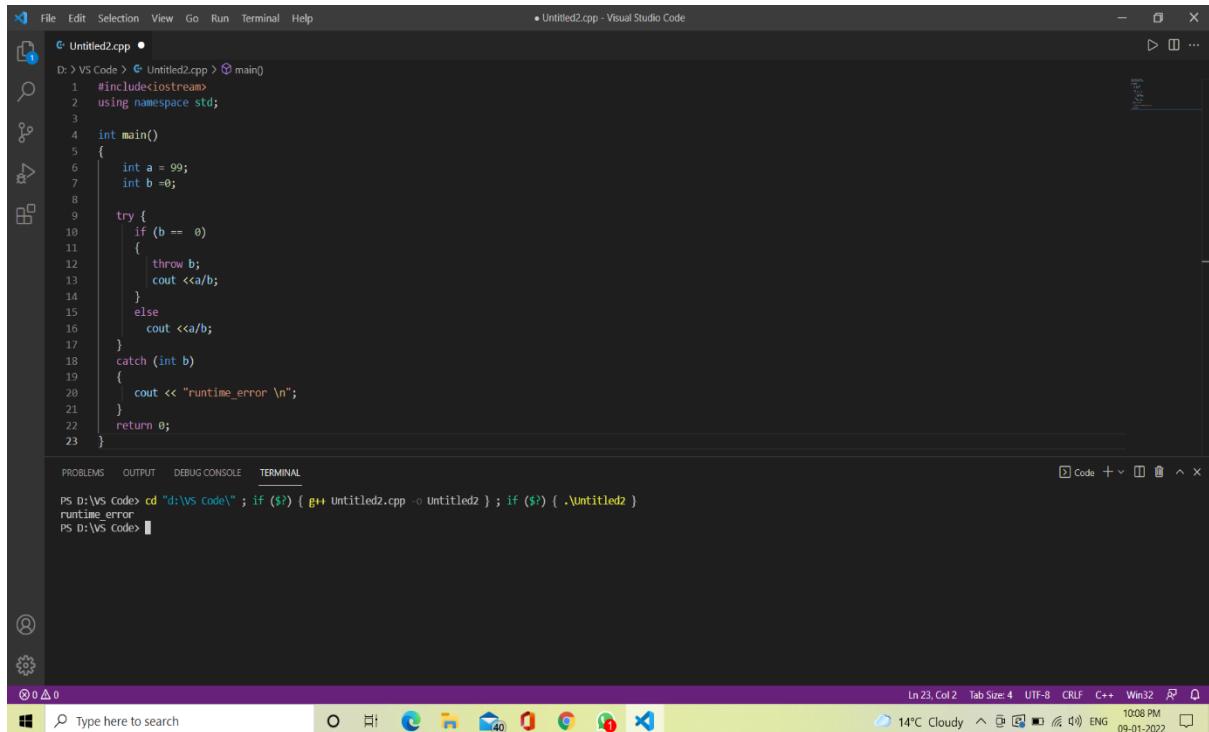
**Source Code :**

```
#include<iostream>
using namespace std;

int main()
{
 int a = 49;
 int b = 0;

 try {
 if (b == 0)
 {
 throw b;
 cout << a/b;
 }
 else
 cout << a/b;
 }
 catch (int b)
 {
 cout << "runtime_error \n";
 }
 return 0;
}
```

## Output



```

D:\> VS Code > Untitled2.cpp > main()
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6 int a = 99;
7 int b = 0;
8
9 try {
10 if (b == 0)
11 {
12 throw b;
13 cout <<a/b;
14 }
15 else
16 cout <<a/b;
17 }
18 catch (int b)
19 {
20 cout << "runtime_error \n";
21 }
22 return 0;
23 }

```

The screenshot shows a Visual Studio Code interface. The code editor displays a file named Untitled2.cpp with the following content:

```

D:\> VS Code > Untitled2.cpp > main()
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6 int a = 99;
7 int b = 0;
8
9 try {
10 if (b == 0)
11 {
12 throw b;
13 cout <<a/b;
14 }
15 else
16 cout <<a/b;
17 }
18 catch (int b)
19 {
20 cout << "runtime_error \n";
21 }
22 return 0;
23 }

```

The terminal below the code editor shows the command to run the code and the resulting output:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
runtime_error
PS D:\VS Code>

```

The taskbar at the bottom of the screen includes icons for File Explorer, Task View, Edge, File Explorer, Mail, OneDrive, Google Chrome, and Task View.

**Task 16.2 WAP in C++ to perform these tasks:**

- b. What will be the output of this program and why?**

**Source Code :**

```
#include <iostream>
using namespace std;

int main()
{
 try
 {
 throw 'a';
 }
 catch (int x)
 {
 cout << "caught" << x << "\n";
 }
 // Here this Catch will be executed
 catch (...)
 {
 cout << "Default Exception\n";
 }
 return 0;
}
```

## Output

D:\> VS Code > Untitled2.cpp > main()

```

1 // What will be the output of this program and why?
2
3 #include <iostream>
4 using namespace std;
5
6 int main()
7 {
8 try
9 {
10 throw 'a';
11 }
12 catch (int x)
13 {
14 cout << "caught" << x << "\n";
15 }
16
17 catch (...)
18 {
19 cout << "Default Exception\n";
20 }
21 return 0;
22 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
Default Exception
PS D:\VS Code> █
```

In 22, Col 2 Tab Size: 4 UTF-8 CRLF C++ Win32 R D

Type here to search

14°C Cloudy 10:13 PM 09-01-2022

**Task 16.2 WAP in C++ to perform these tasks:**

- c. What will be the output of this program and why?

**Source Code :**

```
#include <iostream>
using namespace std;

int main()
{
 try
 {
 throw 'a';
 }
 catch (int x)
 {
 cout << "caught" << x << "\n";
 }
 return 0;
}
```

## Output

The screenshot shows the Visual Studio Code interface. The code editor window displays the following C++ code:

```

D:\> VS Code > Untitled2.cpp > main()
1 // What will be the output of this program and why?
2
3 #include <iostream>
4 using namespace std;
5
6 int main()
7 {
8 try
9 {
10 throw 'a';
11 }
12 catch (int x)
13 {
14 cout << "caught" << x << "\n";
15 }
16 return 0;
17 }

```

The terminal window below shows the command line output:

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) { .\Untitled2 }
terminate called after throwing an instance of 'char'
PS D:\VS Code>

```

The taskbar at the bottom of the screen includes icons for File Explorer, Task View, Edge, Mail, OneDrive, Microsoft Store, Google Chrome, and File Explorer. The system tray shows the date and time as 10:18 PM on 09-01-2022.

**Task 16.2 WAP in C++ to perform these tasks:**

- d. Rethrow and catch an exception by creating a separate user defined divide function for condition divide by zero.**

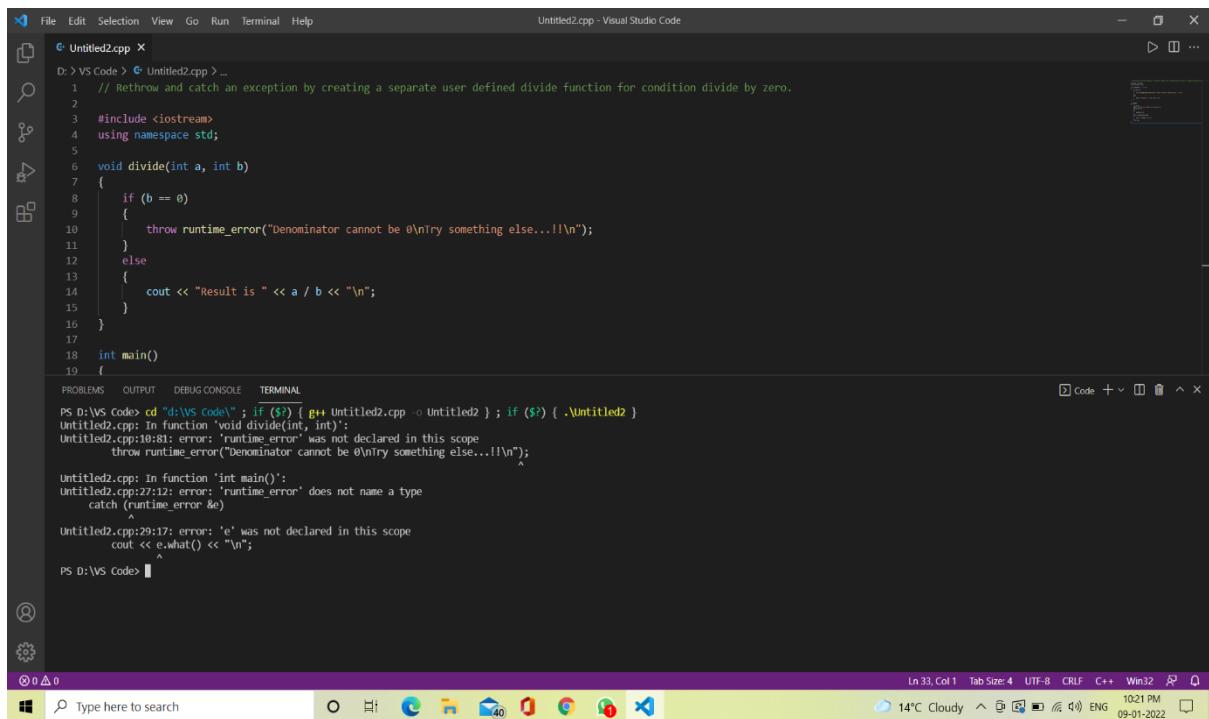
**Source Code :**

```
#include <iostream>
using namespace std;

void divide(int a, int b)
{
 if (b == 0)
 {
 throw runtime_error("Denominator cannot be 0\nTry something else...!!\n");
 }
 else
 {
 cout << "Result is " << a / b << "\n";
 }
}

int main()
{
 int a, b;
 cout << "Enter two numbers for division \n";
 cin >> a >> b;
 try
 {
 divide(a, b);
 }
 catch (runtime_error &e)
 {
 cout << e.what() << "\n";
 }
 return 0;
}
```

## Output



The screenshot shows the Visual Studio Code interface. The code editor window displays a file named Untitled2.cpp with the following content:

```

D:\> VS Code > Untitled2.cpp > ...
1 // Rethrow and catch an exception by creating a separate user defined divide function for condition divide by zero.
2
3 #include <iostream>
4 using namespace std;
5
6 void divide(int a, int b)
7 {
8 if (b == 0)
9 {
10 throw runtime_error("Denominator cannot be 0\ntry something else...!!\n");
11 }
12 else
13 {
14 cout << "Result is " << a / b << "\n";
15 }
16 }
17
18 int main()
19 {

```

The terminal below shows the build process and errors:

```

PS D:\VS Code> cd "d:\VS Code" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if ($?) (.\Untitled2)
Untitled2.cpp: In function 'void divide(int, int)':
Untitled2.cpp:10:81: error: 'runtime_error' was not declared in this scope
 throw runtime_error("Denominator cannot be 0\ntry something else...!!\n");
 ^
Untitled2.cpp: In function 'int main()':
Untitled2.cpp:27:12: error: 'runtime_error' does not name a type
 catch (runtime_error &e)
 ^
Untitled2.cpp:29:17: error: 'e' was not declared in this scope
 cout << e.what() << "\n";
 ^
PS D:\VS Code>

```

The status bar at the bottom indicates the file is 1021 PM on 09-01-2022.

## Practical No. 17

**Q. WAP in C++ with the help of STL:**

a. List:

1. Iterate a int list using iterator and print it
2. Find size of a list
3. Sort a list
4. Reverse a list

### **Source Code :**

```
#include <iostream>
#include <list>
#include <iterator>
using namespace std;

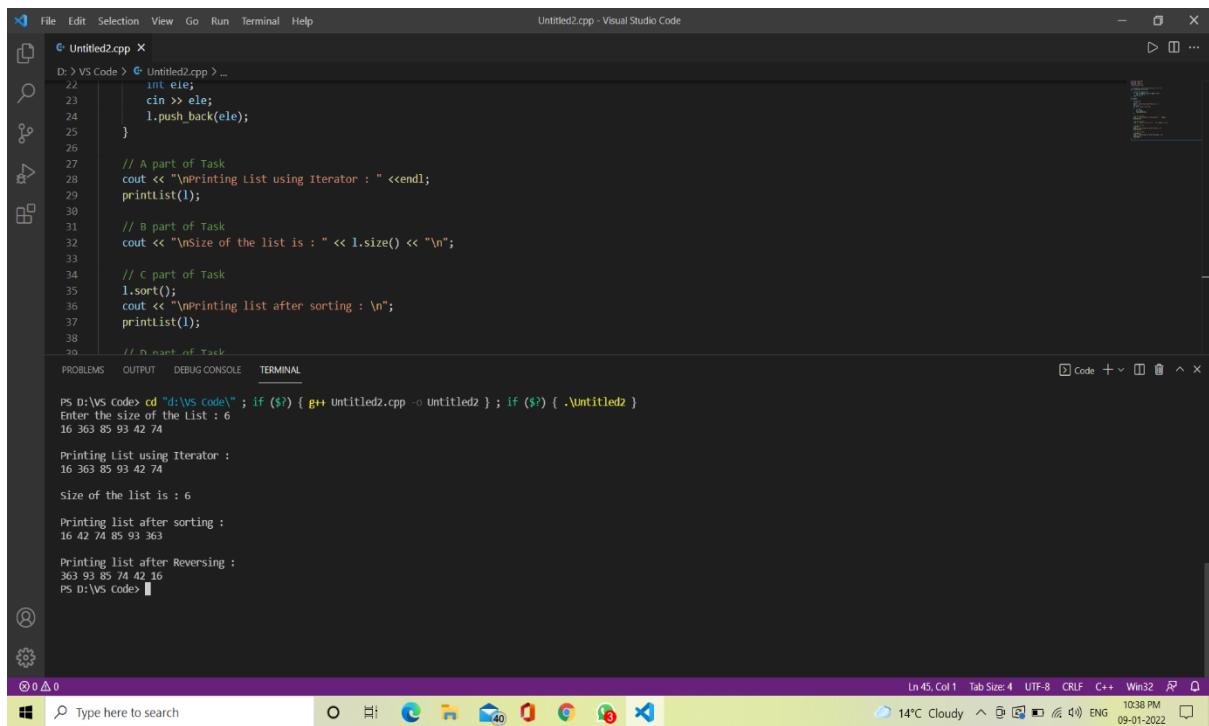
void printList(list<int> g)
{
 list<int>::iterator it;
 for (it = g.begin(); it != g.end(); ++it)
 cout << *it << " ";
 cout << '\n';
}
int main()
{
 list<int> l;
 int n;
 cout << "Enter the size of the List : ";
 cin >> n;
 for (int i = 0; i < n; i++)
 {
 int ele;
 cin >> ele;
 l.push_back(ele);
 }
 cout << "\nPrinting List using Iterator : " << endl;
 printList(l);

 cout << "\nSize of the list is : " << l.size() << "\n";

 l.sort();
 cout << "\nPrinting list after sorting : \n";
 printList(l);

 l.reverse();
 cout << "\nPrinting list after Reversing : \n";
 printList(l); return 0; }
```

## Output



The screenshot shows a Visual Studio Code interface with the following details:

- File Bar:** File, Edit, Selection, View, Go, Run, Terminal, Help.
- Editor:** Untitled2.cpp - Visual Studio Code. The code implements a list manipulation task:

```

D :> VS Code > Untitled2.cpp > ...
22 int ele;
23 cin >> ele;
24 l.push_back(ele);
25 }
26
27 // A part of Task
28 cout << "\nPrinting List using Iterator : " << endl;
29 printList(l);
30
31 // B part of Task
32 cout << "\nSize of the list is : " << l.size() << "\n";
33
34 // C part of Task
35 l.sort();
36 cout << "\nPrinting list after sorting : \n";
37 printList(l);
38
39 // D part of Task

```

- Terminal:** PS D:\VS Code> cd "d:\VS code\" ; If (\$?) { g++ Untitled2.cpp -o Untitled2 } ; If (\$?) { .\Untitled2 }
Enter the size of the List : 6
16 363 85 93 42 74
- Output:**
  - Printing List using Iterator :
  - 16 363 85 93 42 74
  - Size of the list is : 6
  - Printing list after sorting :
  - 16 42 74 85 93 363
  - Printing list after Reversing :
  - 363 93 85 74 42 16
- Status Bar:** Ln 45, Col 1 | Tab Size: 4 | UTF-8 | CRLF | C++ | Win32 | 10:38 PM | 14°C Cloudy | ENG | 09-01-2022

**b. Vector:**

- 1. Insert elements into a int vector**
- 2. Iterate this vector using iterator and print it**
- 3. Find size of a capacity and max size of a vector**
- 4. Resize a vector**
- 5. checks if the vector is empty or not**

**Source Code :**

```
#include <iostream>
#include <vector>
#include <algorithm>
#include <iterator>
using namespace std;

// Function for printing the elements in a vector
void printvector(vector<int> v)
{
 vector<int>::iterator it;
 for (it = v.begin(); it != v.end(); ++it)
 cout << *it << " ";
 cout << '\n';
}

int main()
{
 vector<int> v;
 int n;
 cout << "Enter the size of the vector : ";
 cin >> n;

 // A part of Task
 for (int i = 0; i < n; i++)
 {
 int ele;
 cin >> ele;
 v.push_back(ele);
 }

 // B part of Task
 cout << "\nPrinting List using Iterator : " << endl;
 printvector(v);
}
```

```
// C part of Task
cout << "\nSize of the vector is : " << v.size() << endl;
cout << "Capacity of vector is : " << v.capacity() << endl;

// D part of Task
v.resize(2 * n, 0);
cout << "\nPrinting vector after resizing and intialising after 0 : \n";
printvector(v);

// E part of Task
cout << "\nChecking vector is empty or not : \n";
if (v.empty())
 cout << "Vector is empty.\t";
else
 cout << "Vector is not empty.";

return 0;
}
```

## Output

```

29 // B part of Task
30 cout << "\nPrinting List using Iterator : " << endl;
31 printvector(v);
32
33 // C part of Task
34 cout << "\nSize of the vector is : " << v.size() << endl;
35 cout << "Capacity of vector is : " << v.capacity() << endl;
36
37 // D part of Task
38 v.resize(2 * n, 0);
39 cout << "\nPrinting vector after resizing and initialising after 0 : \n";
40 printvector(v);
41
42 // E part of Task
43

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```

PS D:\VS Code> cd "d:\VS Code\" ; if ($?) { g++ Untitled2.cpp -o Untitled2 } ; if (?) { .\Untitled2 }
Enter the size of the vector : 6
12 634 754 24 85 954

Printing List using Iterator :
12 634 754 24 85 954

Size of the vector is : 6
Capacity of vector is : 8

Printing vector after resizing and initialising after 0 :
12 634 754 24 85 954 0 0 0 0 0 0

Checking vector is empty or not :
Vector is not empty.
PS D:\VS Code>

```

Ln 50, Col 2 Tab Size: 4 UTF-8 CRLF C++ Win32 ⌂ ⌂

Type here to search 14°C Cloudy 10:50 PM 09-01-2022

**c. Map:**

- 1. Insert elements into a <int, string> map**
- 2. insert elements in random order**
- 3. Iterate this map using iterator and print its keys and values**
- 4. Find an element as key from this map**
- 5. assigning the elements from map1 to map2**
- 6. remove all elements with key = x (any key present in map)**
- 7. Find size, max size of a map**
- 8. checks if this map is empty or not**
- 9. Clear a map**

**Source Code :**

```
#include <bits/stdc++.h>
#include <map>
#include <algorithm>
#include <iterator>
using namespace std;

// Function for printing the elements in a map
void printmap(map<int, string> v)
{
 map<int, string>::iterator it;
 for (it = v.begin(); it != v.end(); ++it)
 cout << it->first << " " << it->second << "\n";
 cout << '\n';
}

int main()
{
 map<int, string> m;

 // Inserting Elements in Random order
 m.insert(pair<int, string>(6, "Map"));
 m.insert(pair<int, string>(3, "Iterator"));
 m.insert(pair<int, string>(8, "pair"));
 m.insert(pair<int, string>(1, "coders"));
 m.insert(pair<int, string>(9, "algorithm"));
 m.insert(pair<int, string>(2, "begin"));
 m.insert(pair<int, string>(5, "end"));

 // printing map
 printmap(m);
}
```

```

// 4th part of Task
// Find an element as key from this map
 auto itr = m.find(3);
 cout << "itr is pointing to \n"
 << itr->first << " " << itr->second << "\n";

// 5th Task Assigning one map to another
map<int, string> copyMap = m;
cout << "Printing copyMap :\n";
printmap(copyMap);

// Deleting a key from map
cout << "Deleting a key-value from copyMap : 9 algorithm\n";
copyMap.erase(9);
cout << "Printing map After deleting key = 9 from it\n";
printmap(copyMap);

// Finding size and max size of map
cout << "Size of the map is : " << copyMap.size() << endl;
cout << "maxSize of map is : " << copyMap.max_size() << "\n";

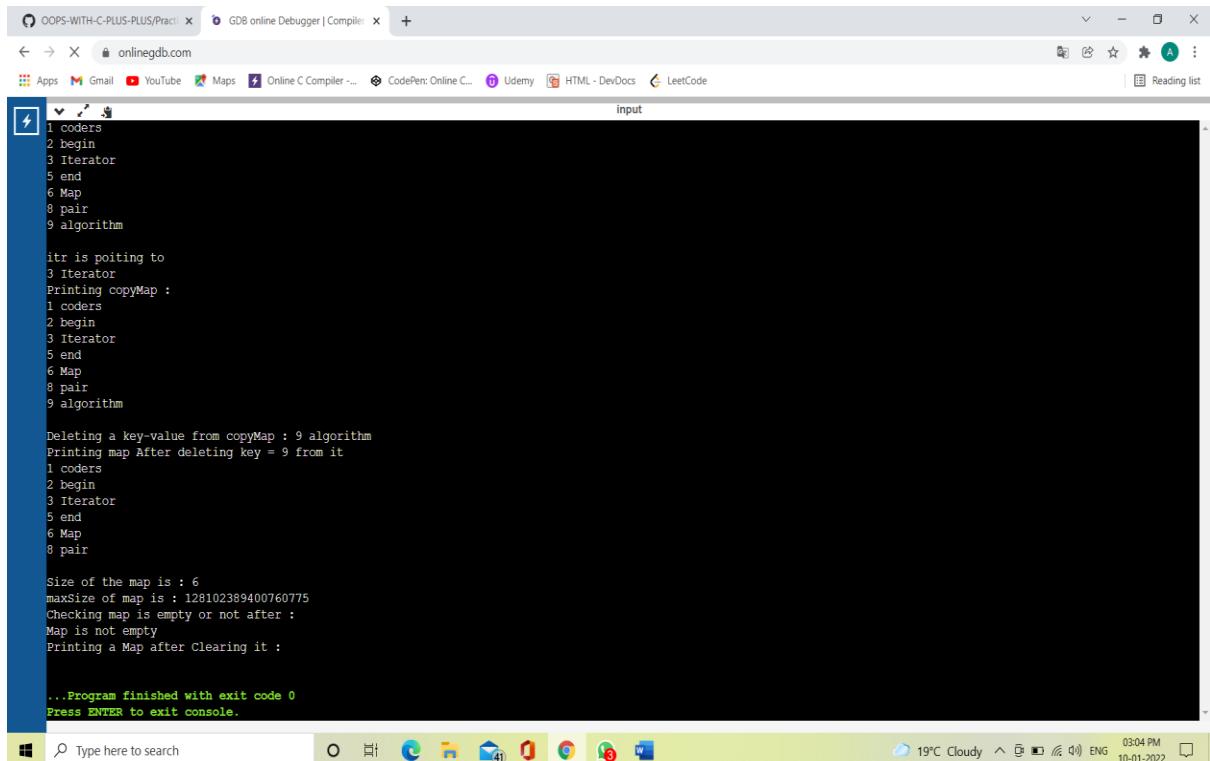
// Checking a map is empty or not
cout << "Checking map is empty or not after :\n";
if (copyMap.empty())
 cout << "Map is empty\n";
else
 cout << "Map is not empty\n";

// Clearing a map
copyMap.clear();
cout << "Printing a Map after Clearing it : ";
printmap(copyMap);

return 0;
}

```

## Output



The screenshot shows a Windows desktop environment. In the center is a terminal window titled "GDB online Debugger | Compiler". The terminal displays the following C++ code and its execution output:

```

1 coders
2 begin
3 Iterator
5 end
6 Map
8 pair
9 algorithm

itr is pointing to
3 Iterator
Printing copyMap :
1 coders
2 begin
3 Iterator
5 end
6 Map
8 pair
9 algorithm

Deleting a key-value from copyMap : 9 algorithm
Printing map After deleting key = 9 from it
1 coders
2 begin
3 Iterator
5 end
6 Map
8 pair

Size of the map is : 6
maxSize of map is : 128102389400760775
Checking map is empty or not after :
Map is not empty
Printing a Map after Clearing it :

...Program finished with exit code 0
Press ENTER to exit console.

```

The terminal window has tabs at the top: "OOPS-WITH-C-PLUS-PLUS/Prac1" and "GDB online Debugger | Compiler". Below the terminal are the Windows taskbar and system tray.

**d. Algorithm:**

- 1. Convert an Array into a Vector**
- 2. Sort a Vector**
- 3. Reverse a vector**
- 4. Max element in a Vector**
- 5. Min element in a Vector**
- 6. Occurrences of x in a vector**
- 7. Sort an Array**
- 8. Binary Search in an Array**

**Source Code :**

```
#include <bits/stdc++.h>
using namespace std;

void printvector(vector<int> v)
{
 vector<int>::iterator it;
 for (it = v.begin(); it != v.end(); ++it)
 cout << *it << " ";
 cout << '\n';
}

void printArray(int a[], int n)
{
 for (int i = 0; i < n; i++)
 cout << a[i] << " ";
 cout << '\n';
}

int main()
{
// creating a Array
 int arr[] = {12, 27, 45, 81, 8, 43, 63, 74};

// Converting a array into vector
 int n = sizeof(arr) / sizeof(arr[0]);
 vector<int> vec(arr, arr + n);

// sorting an vector
 cout << "Printing vector before sorting : \n";
 printvector(vec);
```

```

sort(vec.begin(), vec.end());
cout << "\nPrinting vector after sorting : \n";
printvector(vec);

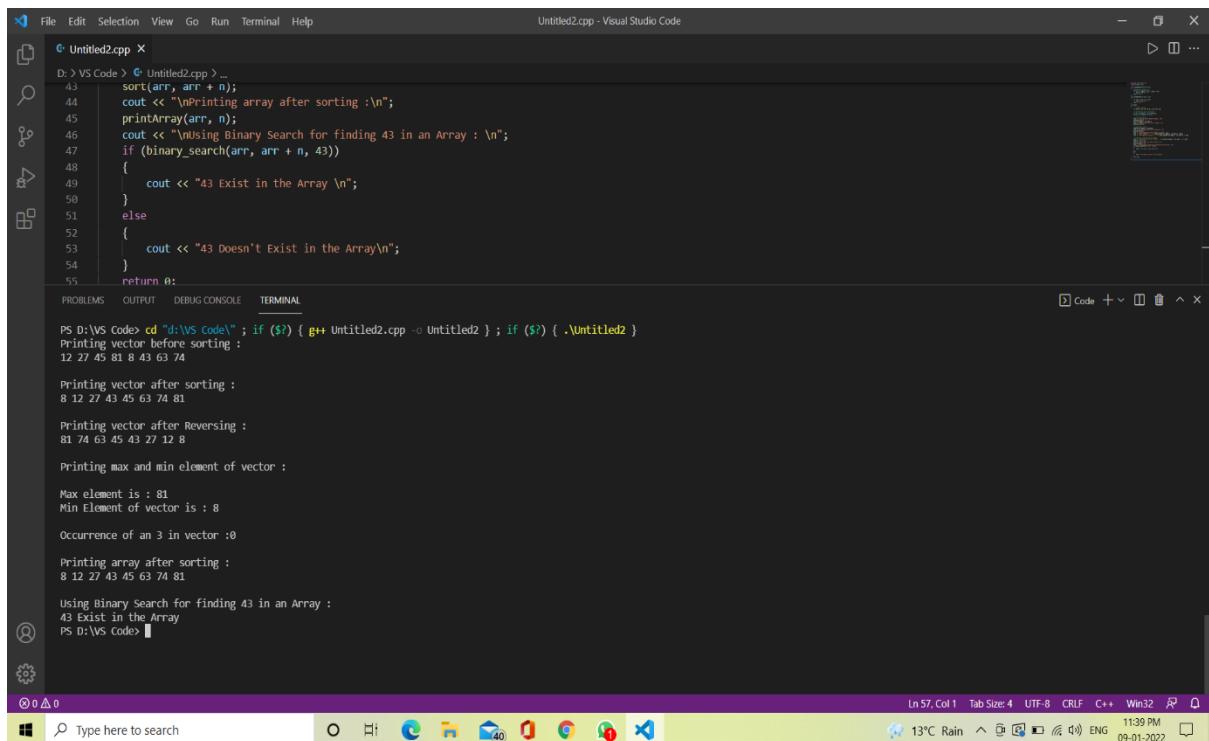
// Reversing a vector
reverse(vec.begin(), vec.end());
cout << "\nPrinting vector after Reversing : \n";
printvector(vec);
cout << "\nPrinting max and min element of vector : \n";
cout << "\nMax element is : " << *(max_element(vec.begin(), vec.end())) << endl;
cout << "Min Element of vector is : " << *(min_element(vec.begin(), vec.end())) << endl;

// counting occurrence of an element
cout << "\nOccurrence of an 3 in vector :" << count(vec.begin(), vec.end(), 3) << endl;
sort(arr, arr + n);
cout << "\nPrinting array after sorting :\n";
printArray(arr, n);
cout << "\nUsing Binary Search for finding 43 in an Array : \n";
if (binary_search(arr, arr + n, 43))
{
 cout << "43 Exist in the Array \n";
}
else
{
 cout << "43 Doesn't Exist in the Array\n";
}

return 0;
}

```

## Output



The screenshot shows a Visual Studio Code interface with the following details:

- File Bar:** File, Edit, Selection, View, Go, Run, Terminal, Help.
- Title Bar:** Untitled2.cpp - Visual Studio Code.
- Code Editor:** Contains C++ code for sorting an array, printing it, and performing a binary search for the value 43. The code includes comments explaining the steps.
- Terminal:** Shows the command `cd "d:\VS Code\" ; if (\$?) { g++ Untitled2.cpp -o Untitled2 } ; if (\$?) { .\Untitled2 }` and its output, which includes the sorted array [8, 12, 27, 43, 45, 63, 74, 81] and the result of the binary search ("43 Exist in the Array").
- Status Bar:** Shows file path (D:\VS Code\Untitled2.cpp), line count (Ln 57, Col 1), tab size (Tab Size: 4), encoding (UTF-8), file type (C++), build system (Win32), and date/time (11:39 PM, 09-01-2022).
- Taskbar:** Shows the Start button, a search bar with placeholder "Type here to search", and pinned icons for File Explorer, Task View, Edge, Mail, OneDrive, Google Chrome, and File History.