This question paper contains **8** printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **3325**

Unique Paper Code : **2344001101**

Name of the Paper : **GE (NEP-UGCF-2022) : Programming Using C++**

Name of the Course : **B.Sc. (H) Computer Science**

Semester : **V**

Duration : **3 Hours** Maximum Marks : **90**

(Write your Roll No. on the top immediately on receipt of this question paper.)

The paper has *two* sections. *All* questions in **'Section A'** are compulsory.

Attempt any *four* questions from **Section B.**

Part of question must be answered together.

Section–A

1. (*a*) Find out the error(s) in the code fragments given below :

(*i*) 1

```
#include <iostream>
using namespace std;
int main( )
{
int a = 1, b;
cin >> b;
cout << "Sum:" a + b;
return 0;
}
```

P.T.O.

(ii) 1

```
#include <iostream>
using namespace std;
void fun()
void fun()
{
cout << "Hello";
}
int main()
{
fun();
return 0;
}
```

(iii) 2

```
# include <iostream>
using namespace std;
int main()
{
int a = 10;
if (a)
{
int b = 20;
}
cout << b;
return 0;
}
```

(*iv*) 2

```
#include <iostream>
using namespace std;
int main()
{
const int x = 10;
x = 20;
cout << x;
return 0;
}
```

(*b*) Write a C++ expression to represent each of the following conditions : 3

(*i*) Character `ch` is a whitespace (space, tab, newline).

(*ii*) Number *num* is a multiple of 3 but not the multiple of 5.

(*iii*) Character *ch* is a lowercase vowel.

(*c*) Explain the call by reference with the help of suitable example. 3

(*d*) Write a function named `reverseNumber` which accepts a number and returns reverse of it. 3

(*e*) Write a program to find out the Highest Common Factor (HCF) of two numbers given by the user. 3

(*f*) Given the following two function prototypes : 3

```
int area (int width, int length = 1);
int area (int size);
```

Write statements to call both functions with appropriate parameters.

(g) Write the output of the following codes :

(i) 2

```
#include <iostream>
using namespace std;
int main()
{
int n, j = 22, k = 11;
n = (j/k ? ++k : --k);
cout <<"n = "<<n<<", k = "<<k;
return 0;
}
```

(ii) 3

```
#include <iostream)
using namespace std;
void updateValues (int & a, int b, int &c)
{
a = a + b;
b = b + c;
c = a + c;
}
int main( )
{
int a = 5, b = 10, c = 15;
updateValues (a, b, c);
cout << "a = " << a << ", b = " << b << ",
c = " << c;
return 0;
}
```

(*iii*) 4

```
#include <iostream>
using namespace std;
int main( )
{
int a = 1;
int b = a++;
int c = ++b;
int d = c++;
cout <<a<<endl<<b<<endl<<c<<endl<<d;
return 0;
}
```

Section B

2. (*a*) Write the output of the following code : 2

```
# include <iostream>
using namespace std;
int main()
{
int a = 5;
int *p = &a;
*p = *p + 10;
cout << "Value of a : " << a << endl;
cout << "Value of *p : " << *p << endl;
return 0;
}
```

(*b*) What is a virtual function ? Explain it with the help of a suitable example in C++. 5

(*c*) What is compile time polymorphism ? How function overloading can be used to implement the compile time polymorphism ? Explain with the help of example. 8

P.T.O.

3. (*a*) Rewrite the following code using while loop : 3

```
int count = 0;
for (int i = 0; i < n; i++)
{
if (arr[i] % 2 == 0)
{
count ++;
}
}
```

(*b*) Write a C++ program to implement add, subtract, multiply and divide of two numbers using switch statement. (Note : program should take inputs from user) 6

(*c*) Write a C++ program to print the following pattern : 6

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

4. (*a*) What are static data members ? How are they different from the class data members ? 3

(*b*) Write a C++ program with three classes: `student`, `test` and `result`, where `result` is inherited from the class *`test`* and class *`test`* is inherited from the class `student`.

class `student`: This class should declare two data members, `name` and `rollNo` of appropriate data type, to store the student's name and roll number.

class `test`: This class should declare two data members, `marks1` and `marks2` of appropriate data type, to store the scores for two subjects.

class `result`: This class should declare one data member, `percentage` of appropriate data type, to store the student's overall percentage.

Write `input (...)` and `display (...)` functions of appropriate prototype in the class `student` and `test` for input and display of respective class data members. In class `result`, write `computepercentage (...)` to compute the `percentage` based on `marks1` and `marks2` and display it. Create objects of class `test` and invoke suitable member functions in `main ( )` to display the student name, marks and percentage. 12

5. (*a*) Explain any *three* file stream classes. 3

(*b*) What are constructors ? Explain parameterized constructor with the help of example. 5

(*c*) Define a class `Number` that declares variable *x* of the data type integer and define member function void `increment(Number k)` that takes an object of class `Number k` passed as parameter and increment the data member `x` of object `k`. Write main function and suitable statements to display the object passed as function arguments. 7

6. (*a*) What are function templates ? Write a C++ program to add two numbers using function template. 5

(*b*) Write a C++ program to find the factorial of a number using recursion. 5

(number is given by the user)

(*c*) Write a C++ program to copy the content of file 'A1.txt' to file 'A2.txt' after removing all whitespaces. 5

7. (*a*) Explain manipulator endl and setw with suitable examples. 4

(*b*) Write the output of the following code : 4

```
#include <iostream>
using namespace std;
int main( )
{
int a, b, r;
a = 10;
b = 0;
try
{
if (b==0)
throw 0;
r = a/b;
cout<<"Result = "<<r<<endl;
}
catch (int arg)
{
cout <<"Exception Caught"<<endl;
}
cout <<"End of the Program";
return 0;
}
```

(*c*) Write a C++ program to perform the following matrix operations : 7

- Input two matrices of 3 × 3 from the user.
- Perform addition on two matrices.
- Display the matrix after addition.