

B.E./B.TECH. Degree Examination, December2020

Third Semester

CS16301 – PROGRAMMING AND DATA STRUCTURES II

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. State the output when the following code segment is executed:

```
class Test
{
    private:static int x;
    public: static void fun()
    {
        cout<<x++<< “ ”;
    }
};
```

```
int x =20;
```

```
void main()
{
    Test x;
    x.fun();
    x.fun();
}
```

- a) 20 21 b)20 20 c) 21 21 d) Error

2. State the output when the following code segment is executed:

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

```
int x=10;
int funcheck(int x = 0,int y)
{ return (x + y); }
```

```
int main()
{
    cout << funcheck(10);
    return 0;
}
```

a)20 b) 10 c)Error d)None of the above

3. Consider a binary max-heap implemented using an array. Which one of the following array represents a binary max-heap?
 - a) 25,12,16,13,10,8,14 b)25,16,12,13,10,8,14
 - c) 25,14,16,13,10,8,12 d) 25,14,12,13,10,8,16
4. State the time Complexity of Breadth First Search for a graph with number of vertices(V), number of edges(E)
 - a) $O(V + E)$ b) $O(V)$ c) $O(E)$ d) $O(V * E)$
5. Distinguish Constant and static members of a class.
6. Implement a C++ code snippet to add two numbers by overloading '+' operator.
7. Construct a Binary Search Tree with the following key values: 24,56,12,18,98,54,14,3,88
8. Implement the code snippet to find the shortest path using Warshall Floyd algorithm.

PART B - (4 X16 = 64 marks)

09. (a) Illustrate the use of references as an argument to function and return type of a function. (16)

(OR)

- (b) Write a C++ program with class student with student basic details. Inherit class student by class test which has mark details of students in 'm' subjects and compute test score which is the average of marks in 'm'; subjects. Inherit class student by class sports to compute sports score which is the average of scores gained through various sports activities. Inherit class test and class sports by class result which calculates the final score of the student by giving 70% weightage to test score and 30% weightage to sports score. Use suitable read and print functions in the classes. Use virtual base class. (16)
10. (a) Overload the operators +,- and * to implement various arithmetic operations on complex numbers. (16)

(OR)

- (b) (i) Implement a program in C++ to delete n^{th} line from the given text file. (8)
- (ii) Appraise the usage of function templates in C++ to sort the given set of values. (8)

11. (a) Construct an AVL tree for the given set of values with appropriate rotations: (16)
 { 25,89,12,7,45,11,69,87,27,10,99,1 }

(OR)

- (b) The characters 'a' to 'h' have the set of frequencies based on the first 8 Fibonacci numbers. Construct a Huffman Tree and obtain the codes for the characters 'a' to 'h'. Encode the word "fade" and "deed". (16)

12. (a) A graph with 5 vertices is represented by the following adjacency matrix: (16)
 { { 0, 2, 0, 6, 0 },
 { 2, 0, 3, 8, 5 },
 { 0, 3, 0, 0, 7 },
 { 6, 8, 0, 0, 9 },
 { 0, 5, 7, 9, 0 } }

Apply Prim's algorithm to construct the minimum spanning tree.

(OR)

- (b) Can you come up with a topological ordering of the climbing DAG shown in the following figure. (16)

