

B.E/ B.Tech. Degree Examination, December 2020  
Fifth Semester  
**CS18551-Programming and Data Structures**  
(Regulation 2018)

Time: Three hours

Maximum : 80 Marks

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

1. `void print(float x)`  
`{ cout<<x; }`

`int print(float z)`  
`{cout<<z;}`

what will be the output if `print(6)` is called

- a) 6.0                      b) 6                      c) 6.000000                      d) compiler error

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

```
class One
{
public:
    void print() { cout << "One::print()"; }
};
```

```
class Two : One
{
public:
    void print() { cout << "Two::print()"; }
};
```

```
class Three : public Two
{
public:
    void print() { One::print(); }
};
```

```
int main()
{
    Three b;
    b.print();
}
```

- a) `One::print()`    b) `Two::print()`    c) `One::print() Two::print()`                      d) Compile Error

3. The seven elements 2, 5, 8, 10, 12, 15 and 20 are pushed onto a stack in reverse order, i.e., starting from 20. The stack is popped 4 times and each element is inserted into a queue. Three elements are deleted from the queue and pushed back onto the stack. Now, one element is popped from the stack. The popped item is \_\_\_\_\_.
- a) 8      b) 10      c) 2      d) 15
4. Which of the sorting algorithm gives the best performance when the input array is sorted or nearly sorted?
- a) Insertion sort   b) Selection sort      c) Quick sort      d) Merge sort
5. Differentiate function overriding and function overloading.
6. What is the output of the following program. If any error, report the error message on execution. Justify your answer. Correct the program to get the output.

```
#include<iostream>
using namespace std;
class Test
{
    int x;
    public:
    virtual void show() = 0;
    int getX()
    {return x; }
};
int main(void)
{   Test t;
    return 0;
}
```

7. Q is an empty queue. The following operations are done on it:
- ADD 15  
ADD 17  
ADD 26  
DELETE  
ADD 83  
DELETE  
DELETE  
ADD 40
- What will be the content of Q at front and rear after these operations?
8. Illustrate the iterations in binary search to find the key element 26 in the array {15,26,47,28,96}

**PART B - (4 X16 = 64 marks)**

09. (a) (i) Write a C++ program with a class student and data members name, rollno and marks of subjects. Use a friend function to calculate and display the percentage of marks. (8)
- (ii) Write a C++ program to compute the volume of a cube, cuboid and cylinder using constructor overloading. (8)

**(OR)**

- (b) (i) Create a class Employee with data members employeeID, name, designation and salary. Use appropriate member functions to get the inputs and display the outputs. Also, write a method to display grade of the employees based on salary, assuming suitable grades. **(8)**
- (ii) Write a C++ program to implement TIME class with data members hr, min and sec. Overload + operator to add two TIME using member function and display the result in time format. **(8)**
10. (a) (i) Create classes student and sports. Declare getdetails() to read student details and marks. Declare getsm() to read sports mark. Derive a class from student and sports and define display() to determine the total and average of the student. Identify the inheritance and implement the same. **(8)**
- (ii) Implement the following pseudo-code as an executable C++ program by including necessary constructs. **(8)**

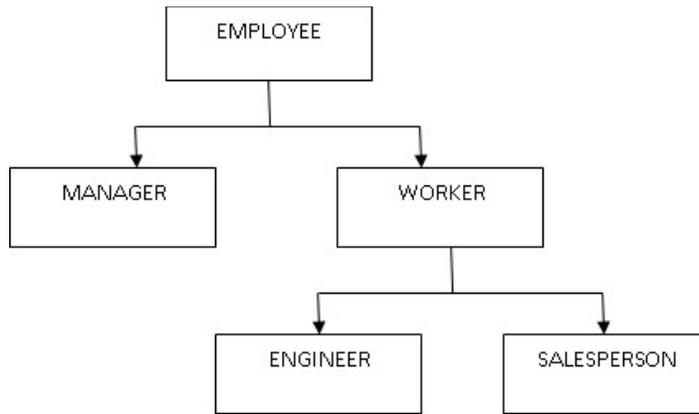
```

Class Book
{
//name, author as member variables,
read()
display()
}
//Privately derive Publisher from Book
{
//pub_id, pub_name as member variables
read()
display()
}
main()
{
//Read and display name, author, pub_id and pub_name
}

```

**(OR)**

- (b) (i) Create a base class shape and derive classes Point, rectangle, triangle and line from it. Declare a pure virtual function show() in base class and define the same function in all the derived classes. Use appropriate C++ construct to display the function show() in base classes and derived classes. **(8)**
- (ii) Identify the inheritance and write a C++ program to implement the same assuming suitable data members and member functions. **(8)**



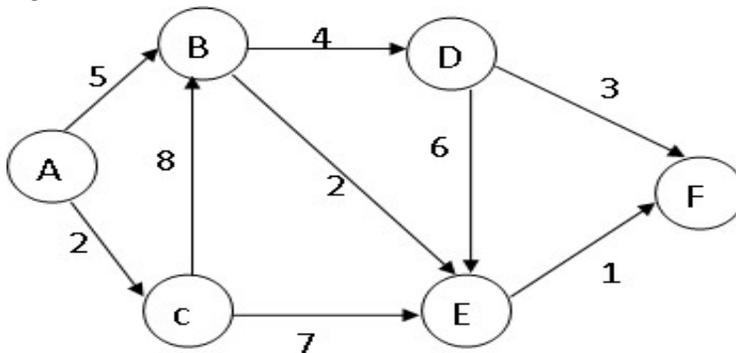
11. (a) (i) Write a C++ program to create a linked list and perform insertion randomly given the position and display the list at every step of insertion. (8)
- (ii) Write a C++ program to implement subtraction of two polynomials (8)
- (OR)**
- (b) (i) Convert the following infix expression into its equivalent post fix expression  $10 + 3 * 5 / (16 - 4)$ . (8)
- Also, evaluate the resultant postfix expression.  
Use stack to show the step by step conversion and evaluation.

- (ii) Write a C++ program to implement queue using single stack with PUSH and POP operations (8)

12. (a) Create a Binary Search Tree T with the elements in the order 34,20,18,9,39,10,24,35,61,75,46,55,7,22,38. (8)
- i) Show the tree after inserting each key. (8)
- ii) Delete key 38,24, and 34 successively from T. (4)
- iii) Perform In-order, Pre-order and Post-order traversals for the resultant tree (4)

**(OR)**

- (b) i) Determine the shortest path from vertex A to all other vertices using Dijkstra's algorithm. (12)



- ii) Also, represent the graph using adjacency matrix and adjacency list. (4)