NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR
Department of Computer Science and Engineering
Major Exam (Autumn 2018)

	Semester: 3rd (CSE/IT)	Time Allotted: 3 hours
Course: OOPS	Dated: 17/11/2018	Credits: 04
Max Marks: 60		

Note: Attempt only 4 questions. All questions carry equal marks. Vague answers and/or inaccurate or missing elaboration receive no marks.

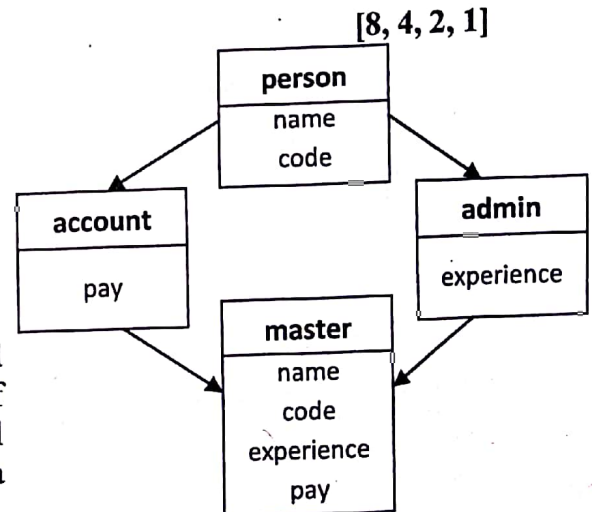**Q1.**
a) What are manipulators? With the help of syntax, explain the working of any *four* manipulator functions.

b) Create a class that includes a data member that holds a 3 x 3 matrix and member functions to read and display elements of the matrix. Add a member function, whose **return type** is **object** of same class, to find transpose of the matrix. Write main function as well.

c) Write a program to use function calling on the left side of assignment operator (function is returning a reference to the variable). Write the code for main as well as function.

d) Explain the significance of **inline** functions.   [5, 5, 3, 2]

Q2.
a) Write code to overload
  i) assignment operator for string class,
  ii) insertion and extraction operator.

b) With the help of an example, explain the difference between deep copy and shallow copy.

c) When do we use friend functions in operator overloading?

d) What are dynamic constructors?   [8, 4, 2, 1]

Q3.
a) Consider a class network of the given figure. The class **master** derives information from both **account** and **admin** classes which in turn derives information from the class **person**. Define all the four classes and write a program to create, update and display the information contained in master objects.

b) Design a class hierarchy for persons, students, and master students, such that a person has a **name** (of type string), a student is a person with an additional **roll_number** (of type int), and a master student is a student with an additional **subject** (of type string). Provide suitable constructors for the classes and make sure that all data members are private. Write a virtual member function **info** that prints all information (i.e., the data members) about a person and override this function in the derived classes such that also the additional information about students and master students is printed.

c) What are the conditions required to be satisfied for an overloaded casting operator?   [6, 6, 3]

Q4. a) Write a class **Work** whose objects represent **working** times (in whole minutes) and **salary rates** (in whole rupees per minute). With this class, the following operation shall be possible:

```
Work* w = new Work(25, 60); // 25 rupees/min, 60 min
w->add(65); // add 65 minutes working time
w->printSalary(); // prints salary "31,25" (31*125 Rupees)
Work::reset(w); // reset working time to zero
bool okay = w->subtract(60);//attempts to subtract 60 minutes
                    // returns false, if not sufficient time
                    // available (time remains unchanged)
int r = w->compare(v); // 0 if salaries of w and v are equal,.
                    // 1, if w's salary is bigger, -1, else
Work u(v); // u becomes a copy of v
```

b) How is polymorphism achieved at runtime? Support your answer with an example.

[11, 4]

Q5. a) Write a program to create a function template for finding the maximum value contained in an array.

b) Consider the following segment of a program:

```
string s1("man"), s2, s3;
S2.assign(s1);
S3=s1;
string s4("wo" + s1);
s2 += "age";
s3.append(ager);
s1[0] = 'v';
```

State the contents of the objects s1, s2, s3 and s4 when executed.

c) *"Non const function can be called by non const objects."* Comment.

d) What are the advantages of using exception handling mechanism in a program?

[5, 4, 3, 3]