Jaypee Institute of Information Technology, Noida
End Term Examination 2018
B.Tech. (CSE/IT/ECE) 2nd Semester

Course Title: Software Development Fundamentals-II / Data Structures/ Object Oriented Programming
Course Code: 15B11CI211/ 10B11CI211/ 10B11CI311

Max. Hours: 2Hr
Max. Marks: 35

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1. **[8 Marks]** Write a C++ program for the given scenario. Assume that JCell company has two kinds of cell users : post-paid and prepaid. Post-paid user gets some fixed free talk time and rest is computed at the rate of Rs. 1.90 per pulse (minute). Prepaid have fixed talk time based on recharge value. Define a class Celluser as a base class and derive the hierarchy of classes. Define data members and member functions which are necessary to
   (a) Retrieve the talk time left for each user
   (b) Print the bill in a proper format containing all the information for the post-paid user.
   (c) Print the total number of cell users.

2. **[8 Marks]** Create a class MagicNumber that contains two data members: a and b of integer type. Create a calculate() function which computes the magic number value using the formula M = 2a + b and return it. For example, if a= 2, b=4 then calculate() function will return 8 (2*2 + 4 = 8). The default constructor of MagicNumber will set a=1, b=2. The parameterized constructor will set a and b based on user inputs.
   (a) Overload the operator <= which compares two MagicNumber objects M1, M2 and will display M2 is greater if M1 magic number value <= M2 magic number value otherwise display M1 is greater.
   (b) Overload the binary + operator which adds two magic numbers by adding their a values and b values respectively.

   In main function, create a MagicNumber object M1 using default constructor and another MagicNumber object M2 using parameterized constructor. Compare M1 and M2 using <= operator. Add M1 and M2 and display the output magic number value.

3. (a) **[4 Marks]** Suppose three stacks are given as S1, S2, S3 with starting configuration shown on the left, and finishing condition shown on the right. Write a sequence of push and pop operations that is executed from start to finish with minimum number of steps. For example, to pop the top element of S1 and push it onto S3, write steps in the form of S3.push (S1.pop()).

Start			Finish		
A					B
B					D
C					A
D					C
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S1	**S2**	**S3**	**S1**	**S2**	**S3**

   (b) **[4 Marks]** Apply selection sort in given sequence to arrange the elements in ascending order. Show the entire sorting process in stepwise manner. 75, 35, 42, 13, 87, 24, 64, 57

P.T.O.

4. **[5 Marks]** Write a C program to find the Greatest Common Divisor (GCD) of two numbers using recursion. The values are input from file "Input.txt" and output is to be written in the file "Output.txt".

5. **[3+3 Marks]** What will be the output of the following codes. Write the justification for each output.

(a)

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

class Test
{
private:
        static int count;
public:
        Test& fun();
};

int Test::count = 0;

Test& Test::fun()
{
        Test::count++;
        cout << Test::count << " ";
        return *this;
}

int main()
{
        Test t;
        t.fun().fun().fun().fun();
        return 0;
}
```

(b)

```
#include<iostream>
using namespace std;
class Point {
private:
  int x, y;
public:
  Point() : x(0), y(0) { }
  Point& operator()(int dx, int dy);
  void show() {cout << "x = " << x << ", y = " << y;
}
};

Point& Point::operator()(int dx, int dy)
{
   x = dx;
   y = dy;
   return *this;
}

int main()
{
  Point pt;
  pt(3, 2);
  pt.show();
  return 0;
}
```