

Mid-Semester Examination, March-2020

Data Structure and Algorithms(CSE 2001)

Programme: B.Tech.(All Branch)

Semester: 2nd

Full marks: 30

Time: 2 hours

Subject Learning Outcome	*Taxonomy Level	Question Number	Total Marks
Ability to state and explain the basic programming syntax, semantics, building blocks .	L1	2(b,c)	4
Ability to develop java applications using the programming tools like conditional statements,looping, arrays, methods and structure.	L2, L3	1c, 2a, 3(a,b), 4(a,b,c), 5(a,c)	18
Ability to analyze, debug and test the programs and correctly predict their output.	L4	1(a,b), 3c, 5b	8
Ability to differentiate behaviors of different data structures and their memory representation.			
Ability to choose the appropriate data structures that efficiently model the problem of interest.			
Ability to apply advanced programming technique for developing solution of different problems.			

* Blooms taxonomy levels: Knowledge (L1), Comprehension (L2), Application (L3), Analysis (L4), Evaluation (L5), Creation (L6)

Answer all questions. All questions carry equal marks. All bits of each question carry equal marks.

The figures in the right side indicate marks.

1. (a) Find the output or error of the given code.If error then re-write the code so that it will give output.

[2]

```
class Test
{
    static int i;
    double d;
}
```



```
class check
{
    public static void main(String args[])
    {
        Test t1=new Test();
        t1.i++ ;
        t1.d++;
        System.out.println(t1.i);
        System.out.println(t1.d);
        Test t3=t1;
        t3.i=t3.i++;
        t3.d=t3.i+t3.d+7.325;
        System.out.println(t1.i);
        System.out.println(t1.d);
        System.out.println(t3.i);
        System.out.println(t3.d);
    }
}
```

- (b) Find the output or error of the given code. If error then re-write the code so that it will give output. [2]

```
interface check
{
    int a;
    void print()
    {
        System.out.println("hello");
    }
}

class test
{
    public static void main(String args[])
    {
        check cl=new check();
        System.out.println(cl.a);
    }
}
```



```
        System.out.println(c1.print());  
    }  
}
```

- (c) Define a class called Complex with instance variables real, imag and instance methods display() and add(). Initialize the two complex number by using parametrized constructor. Write a Java program to add two complex number. The prototype of add method is:
public Complex add(Complex, Complex) [2]
2. (a) Write a Java program to declare a Class named as Student which contains rollno, name and course as instance variables and Student (rollno,name,course) and displayStudent () as constructor and instance methods. A derived class Exam is created from the class Student . The derived class contains mark1, mark2, mark3 as instance variables representing the marks of three subjects and inputMarks () and displayResult () as instance methods. [2]
- (b) For the Question no. 2(a) Create an array of objects of the Exam class and display the result of 5 students. [2]
- (c) Define Interface in Java. How the interface is differentiated from abstract class explain with proper examples. [2]
3. (a) Define an interface EmpInterface (void displayEmp(), void giveBonus(double amount)). Define an abstract class Employee (empID, Fname, Lname, salary). [2]
- (b) Use Question no:3(a) and define a concrete class Manager (bonus) subclass of Employee and define the interface methods. Perform the followings: Define the appropriate constructor in class hierarchy Ensure the bonus amount should not be negative and zero using exception handling. Create an array of interface reference variables and populate with manager objects. [2]
- (c) Initialize an array with name of the students. Identify 2 exceptions that may be generated & write exceptional handler in Java. [2]
4. (a) Write a Java program to read withdraw balance from keyboard. Treat withdraw balance <100 as withdrawException(user defined). The Exception should print "Invalid amount". [2]

- (b) Write a java program using Generics to swap two generic variable of same type. Show the swap with different data type. [2]
- (c) Write a java method using Generics to search of an element in an array of any type. The signature of search method is given below.
public static <T>int search(T[] array, T item) [2]
5. (a) Write a recursive method in Java to find the nth Fibonacci number. [2]
- (b) Draw the recursive trace for Question no 5(a). Let the number n=6. [2]
- (c) Write a recursive method in Java to find the binary equivalent of a positive decimal integer. [2]