

Section- A

- 1.(a) Which of the following are legal identifiers in Java? 1.75
 (i)g (ii)void (iii)101dalmatians (iv)Hello, World (v)<greeting>
- (b) What does this sequence of statements print? 1.50
 Rectangle box = new Rectangle(5, 10, 20, 30);
 System.out.println("Before: " + box.getWidth());
 box.translate(25, 40);
 System.out.println("After: " + box.getWidth());
- (c) What is encapsulation? Why is it useful? 2.00
- (d) Consider the following implementation of a class Square : 2.00
 public class Square{
 private int sideLength;
 private int area; // Not a good idea
 public Square(int length){
 sideLength = length;
 }
 public int getArea(){
 area = sideLength * sideLength;
 return area;
 }
 }
- Why is it not a good idea to introduce an instance variable for the area? Rewrite the class so that area is a local variable.
- (e) Write the difference between equals() method and equality operator (==) in Java. 1.50

- 2.(a) What is vector? How is it different from an array? 2.75
- (b) How does String class differ from the StringBuffer class? Explain with example. 3
- (c) Write a method called 3
 delete (String str, int m)
 that returns the input string with the mth element removed.

- 3.(a) What do these loops print by given the variables 2.00
 String stars = "*****";
 String stripes = "=====";
- ```

 (i) int i = 0;
 while (i < 5){
 System.out.print(stars.substring(0, i));
 System.out.println(stripes.substring(i, 5));
 i++;
 }

```

```

(ii) int i = 0;
while (i < 10) {
 if (i % 2 == 0)
 System.out.println(stars);
 else
 System.out.println(stripes);
}

```

1.75

(b) The nested loops

```

for (int i = 1; i <= height; i++) {
 for (int j = 1; j <= width; j++) {
 System.out.print("*");
 }
 System.out.println();
}

```

Display a rectangle for a given width and height, such as (width=4, height=3)

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

Yrpcals

Write a single for loop that displays the same rectangle.

→ (c) Consider the following loop for collecting all elements that match a condition; in this case, that the element is larger than 100. 2.00

```

ArrayList<Double> matches = new ArrayList<Double>();
for (double element : values)
 if (element > 10)
 matches.add(element);

```

Trace the flow of the loop, where values contain the elements 10 9 10 12 8. Show two columns, for element and matches.

(d) How do you perform the following tasks with array lists in Java? 3.00

- (i) Test that two array lists contain the same elements in the same order.
- (ii) Copy one array list to another.
- (iii) Fill an array list with zeros, over writing all elements in it.

4.(a) Why is it a good idea to minimize dependencies between classes? 1.75

(b) You need to write a program for DNA (Contain A, T, C & G) sequence analysis that checks whether a substring of one string is contained in another string. What simpler problem can you solve first? 2.00

(c) Give a rule of thumb for how to find classes and methods when designing a program. 2.00

(d) After discovering a method, why is it important to identify the object that is responsible for carrying out the action? 1.00

(e) Every BMW is a vehicle. Should a class BMW inherit from the class Vehicle ? BMW is a vehicle manufacturer. Does this mean that the class BMW should inherit from the class VehicleManufacturer? 2.00

## Section-B

3.00

- 5.(a) Suppose the class Employee is declared as follows:

```
public class Employee{
 private String name;
 private double baseSalary;

 public void setName(String newName) { . . . }
 public void setBaseSalary(double newSalary) { . . . }
 public String getName() { . . . }
 public double getSalary() { . . . }
}
```

Declare a class Manager that inherits from the class Employee and adds an instance variable bonus for storing a salary bonus. Omit constructors and methods.

- (b) Will the following code fragment compile? Will it run? If not, what error is reported? 1.7:

```
Object obj = "Hello";
System.out.println(obj.length());
```

- (c) What does this code fragment print? Why is this an example of polymorphism? 2.00

```
Measurable[] data =
{ new BankAccount(10000), new Country("Belgium", 30510) };
System.out.println(average(data));
Assume that the class BankAccount, Country and the interface Measurable has a proper definition.
```

- (d) Suppose the class Sandwich implements the Edible interface, and you are given the variable declarations 2.00

```
Sandwich sub = new Sandwich();
Rectangle cerealBox = new Rectangle(5, 10, 20, 30);
Edible e = null;
```

Which of the following assignment statements are legal?

- i. e = sub;
- ii. sub = e;
- iii. sub = (Sandwich) e;
- iv. sub = (Sandwich) cerealBox;
- v. e = cerealBox;
- vi. e = (Edible) cerealBox;
- vii. e = (Rectangle) cerealBox;
- viii. e = (Rectangle) null;

- 6.(a) What is wrong with the following code, and how can you fix it? 3.00

1. public static void writeAll(String[] lines, String filename){
2. PrintWriter out = new PrintWriter(filename);
3. for (String line : lines){
4. out.println(line.toUpperCase());
5. }
6. out.close();
7. }

- (b) The following code tries to close the writer without using a try-with-resources statement:
- ```
PrintWriter out = new PrintWriter(filename);
try{
    //Write output.
    out.close();
} catch (IOException exception){
    out.close();
}
```
- What is the disadvantage of this approach?

1.75

- (c) Suppose the input contains the characters 995.0 Fred. What are the values of number and input after this code fragment?

```
Scanner in = new Scanner(System.in);
int number = 0;
if (in.hasNextInt()) {
    number = in.nextInt();
}
String input = in.next();
```

- 2.00
- (d) How do you move the file pointer to the first byte of a file? To the last byte? To the exact middle of the file?

- 7.(a) Show two different ways of converting String object into Integer in Java. 1

- (b) An n-digit number that is the sum of the n-th powers of its digits is called an Armstrong Number. 4.75
For example, 153 and 370 are Armstrong numbers, since $153 = 1^3 + 5^3 + 3^3$ and $370 = 3^3 + 7^3 + 0^3$. But 15 and 37 are not Armstrong numbers, since $15 \neq 1^2 + 5^2$ and $37 \neq 3^2 + 7^2$. First few Armstrong numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9, 153, 370, 371, 407, 1634 and so on. Write a Java program to find whether the given number is Armstrong or not.

- (c) Why is an Interface used in Java? How is an Interface declared and used? 3

- 8.(a) Consider the following runnable. 3.00

```
public class MyRunnable implements Runnable{
    public void run(){
        try{
            System.out.println(1);
            Thread.sleep(500);
            System.out.println(2);
        } catch (InterruptedException exception){
            System.out.println(3);
        }
        System.out.println(4);
    }
}
```

Suppose a thread with this runnable is started and immediately interrupted:

```
Thread t = new Thread(new MyRunnable());
t.start();
t.interrupt();
```

What output is produced?

- (b) What are the two ways of implementing thread in Java? Provide necessary coding examples. 4.00
- (c) How do threads communicate with each other? 1.75

Answer all five (05) questions

1. Add a method to the Table class below that computes the average of the neighbors of a table element in the eight directions shown in Figure (*Neighboring Locations in a Two-Dimensional Array*)

```
public double neighborAverage(int row, int column)
```

However, if the element is located at the boundary of the array, include only the neighbors that are in the table. For example, if row and column are both 0, there are only three neighbors.

```
public class Table{
    private int[][] values;
    public Table(int rows, int columns) {
        values = new int[rows][columns];
    }
    public void set(int i, int j, int n) {
        values[i][j] = n;
    }
}
```

[i - 1][j - 1] [i - 1][j] [i - 1][j + 1]

[i][j - 1] [i][j] [i][j + 1]

[i + 1][j - 1] [i + 1][j] [i + 1][j + 1]

2. Declare a class ComboLock that works like the combination lock in a gym locker, as shown here. The lock is constructed with a combination of three numbers between 0 and 39. The reset method resets the dial so that it points to 0. The turnLeft and turnRight methods turn the dial by a given number of ticks to the left or right. The open method attempts to open the lock. The lock opens if the user first turns it right to the first number in the combination, then left to the second, and then right to the third.

```
public class ComboLock{
    ...
    public ComboLock(int secret1, int secret2, int secret3) { . . . }
    public void reset() { . . . }
    public void turnLeft(int ticks) { . . . }
    public void turnRight(int ticks) { . . . }
    public boolean open() { . . . }
}
```



3. Consider an interface

```
public interface NumberFormatter{  
    String format(int n);  
}
```

Provide four classes that implement this interface. A DefaultFormatter formats an integer in the usual way. A DecimalSeparatorFormatter formats an integer with decimal separators; for example, one million as 1,000,000. An AccountingFormatter formats negative numbers with parentheses; for example, -1 as (1). A BaseFormatter formats the number in base n, where n is any number between 2 and 36 that is provided in the constructor.

4. Write a program that reads a file containing text. Read each line and send it to the output file, preceded by line numbers. If the input file is

```
Mary had a little lamb  
Whose fleece was white as snow.  
And everywhere that Mary went,  
The lamb was sure to go!
```

Then the program produces the output file

```
/*1*/ Mary had a little lamb  
/*2*/ Whose fleece was white as snow.  
/*3*/ And everywhere that Mary went,  
/*4*/ The lamb was sure to go!
```

The line numbers are enclosed in /* */ delimiters so that the program can be used for numbering Java source files. Prompt the user for the input and output file names.

5. Write a program **Find** that searches all files specified on the command line and prints out all lines containing a reserved word. Start a new thread for each file. For example, if you call

```
java Find Buff report.txt address.txt Homework.java
```

Then the program might print

```
report.txt: Buffet style lunch will be available at the  
address.txt: Buffet, Warren|11801 Trenton Court|Dallas|TX  
Homework.java:.. BufferedReader in;  
address.txt: Walters, Winnie|59 Timothy Circle|Buffalo|MI
```

University of Rajshahi
Department of Computer Science and Engineering
B. Sc. (Engg.) Part-1, Even Semester Examination 2019
Course: CSE-1221 (Object Oriented Programming)
Marks: 52.5 Duration: 3 hours
(Answer 3 questions from each part)

Part -A

- | | | |
|-------|--|------|
| 1. a) | What are the similarities and differences between Java and C++? | 2.5 |
| b) | What is the role of Java Virtual machine? | 2.5 |
| c) | In the following code snippet, explain what each of the keywords is used for.
<pre>public static void main (String []args) throws IOException { // code inside main method }</pre> | 3.75 |
| 2. a) | In the following Java code Identify as many of the mistakes as you can. Explain whether each mistake you identify will cause compilation error, runtime error or logical error. | 7 |

```

1 public Class mycode.java
2 {
3     void static public fun main(String [args])
4     begin
5         Leaf tr = null;
6         for (i=1; i>10; ++i)
7             tr = new Node(i, tr)
8             tr.print();
9     end;
10 }
11
12 class Leaf {
13     integer value;
14
15     Leaf(int value){ this = value; }
16
17     public void print(){ System.out.println(value); }
18 }
19
20 class Node extends Leaf {
21     Leaf left, right;
22
23     Node(leaf l, Leaf r) { left = l, right = r; }
24
25     void print(){
26         left.print();
27         System.out.println("val=" @ value);
28         right.print();
29     }
30 }

```

- | | | |
|-------|---|------|
| b) | Distinguish between overloading and overriding with examples In Java code.. | 1.75 |
| 3. a) | What are the differences and similarities between abstract class and Interface? Mention a situation when the use of one of them is preferable over the other. | 3.5 |
| b) | See the program below. Identify and explain the problems in the code. After fixing the problem, what will be the output? | 3 |

```

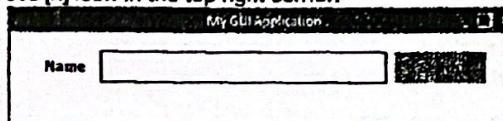
1 class Base {
2     final public void Print() {
3         System.out.println("Base");
4     }
5 }
6
7 class Derived extends Base {
8     public void Print() {
9         System.out.println("Derived");
10    }
11 }
12
13 class Main {
14     public static void DoPrint( Base o ) {
15         o.Print();
16     }
17     public static void main(String[] args) {
18         Base x = new Base();
19         Base y = new Derived();
20         Derived z = new Derived();
21         DoPrint(x);
22         DoPrint(y);
23         DoPrint(z);
24     }
25 }

```

- 2.25
- c) What are the purposes of super keyword in Java? 2.75
4. a) What do you understand by object-oriented design pattern? Why should we use them? 3
- b) Suppose that your program has a class that you want to have only one instance created and this instance must be reused during the lifetime of your program. Which design pattern will you use to implement that. Explain with example. 3
- c) Briefly discuss the idea of Observer pattern with example. 3

Part -B

5. a) Explain exception handling mechanism in Java. 3
- b) When is throws keyword is used in Java? 1.5
- c) Explain the hierarchy of exceptions in Java? 3
- d) What are checked and unchecked exceptions in Java? 1.25
6. a) What is thread? Describe the life cycle of a thread. 4
- b) How do you ensure that n threads can access n resources without deadlock? 2
- c) What is "Instance Variable Hiding" problem? How can this problem be solved? 2.75
7. a) What are the functions of Event object, event source and event listener in delegate event model? Explain with diagram. 3
- b) what are the advantages of swing over AWT? 2
- c) Write an AWT based application that uses FlowLayout manager to layout the following UI that can be closed by clicking cross [x] icon in the top right corner. 3.75



8. a) In a large project it is possible that two programmers, working on different parts of the code, happen to select the same name for a class that they define. If this accident leads to some third programmer accessing the wrong one of these two classes, the results could be unsatisfactory. Explain the steps that the designers of the Java language have taken to reduce the probability of such incident. 2
- b) Explain what problem can arise while using the following generic class. How to fix it? 3

```

1 class Stats<T> {
2     T[] nums;
3
4     Stats(T[] o) {
5         nums = o;
6     }
7
8     double sum() {
9         double x = 0.0;
10        for(int i=0; i < nums.length; i++)
11            x += nums[i].doubleValue();
12
13        return x;
14    }
15

```

- c) Write a Java program that reads the content of a file and writes the content back to another file. 3.75

University of Rajshahi
 Dept. Of Computer Science and Engineering
 B. Sc. Engg. Part 1 Even Semester Examination 2019
 Course: CSE 1221 (Object Oriented Programming) (for the session 2016-2017)
 Full Mark: 52.5 Duration: 3 hours
Answer 6 questions taking at least 3 from each part

Part -A

- | | | |
|-------|--|------|
| 1. a) | What is Object Oriented Programming? Give a brief description of polymorphism, encapsulation and inheritance? | 3.75 |
| b) | What are the differences between C and C++? | 3 |
| c) | What is the use of 'protected' access specifier? | 2 |
| 2. a) | What are the problems with the following code segment? | 2 |
| | <pre>int *I, *j; j=I*2; cout>>j;</pre> | |
| b) | What are the purposes of constructor and destructor function? Can these functions have input parameters and return type? | 2.75 |
| c) | What is an inline function? With example explain the different ways to declare a function as inline. | 2.5 |
| d) | Is there any way for a non-member function to access private members of a class? Explain. | 1.5 |
| 3. a) | How between new and delete is different from malloc() and free() ? | 3 |
| b) | What are the advantages of using reference over pointer? What are the restrictions of using reference? | 3.75 |
| c) | Is the following fragment valid? If not, then why? | 2 |
| | <pre>int &f(); : int *x(); x=f();</pre> | |
| 4. a) | Why copy constructor is used? Explain with example | 3.75 |
| b) | What is wrong with the following function prototype?
<code>char * f(char *p, int x=0, char *q)</code> | 2 |
| c) | Explain how ambiguity can arise while overloading functions. | 3 |

Part -B

- | | | |
|-------|--|------|
| 5. a) | What do you mean by operator overloading? What are the restrictions applied to operator overloading? | 2.75 |
| b) | What are the advantages of overloading an operator using friend function? | 3 |
| c) | Explain why protected access specifier is used while inheriting a base class? | 2 |
| d) | In derived class, in which order constructors and distractors are called? | 1 |
| 6. a) | What is multi-level inheritance? Describe a scenario in which multi-level inheritance can cause | 2.5 |

- ambiguity. 1.25
- b) How the ambiguity mention above can be solved? 3
 - c) Write a short program that will use C++ I/O to copy content of a text file and write that content into another file. 2
 - d) What is an abstract class? Can we create instances of an abstract class? 2
7. a) Distinguish between runtime and compile time polymorphism? How runtime polymorphism is achieved? 3.75
- b) What is the difference between virtual function and overloaded function? 2
 - c) What is a pure virtual function? How a pure virtual function is declared? 1
 - d) Define early binding and late binding with example. 2
8. a) What is exception handing? Explain various types of exception handing 3
- b) What is the difference between expectation and errors? 1
 - c) What is Standard Template Library? 2
 - d) How can you rethrow an exception? Explain with example. 2.75

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Marks: 52.5 Duration: 3 hours

(Answer 3 questions from each part)

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Part -A

- | | |
|---|------|
| 1. a) Why java is called "the language of the Internet"? Explain. | 2 |
| b) Compare Java with C programming language. | 2 |
| c) Consider the following java program: | 4.75 |

```
public interface IRunnable {
    public void run();
}

Class JavaApp extends ClassA, ClassB implements IRunnable
{
    void main(String args) {
        System.in.println("This is a Java program.");
    }
}
```

Point out the mistakes. Also, correct the program so that it can be compiled.

- | | |
|---|------|
| 2. a) What is singleton class? | 1.5 |
| b) What is Final keyword in Java? Give an example. | 2.25 |
| c) Write a program in Java which take 10 numbers, store it in a combo box and display the largest one. | 3 |
| d) What happens if an exception is not caught? | 2 |
| 3. a) You are writing a program which can draw various 2D shapes like circle, rectangle, triangle and 3D shapes like cube and spheres of with different colors and calculate the area and volume of the shapes. | 4.5 |

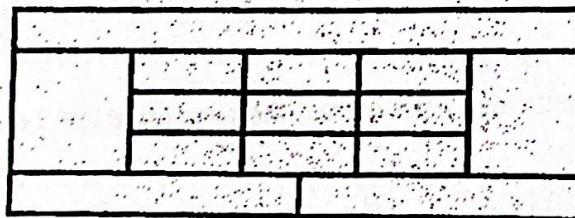
With class diagram explain how you will achieve the task in an object-oriented manner?

- | | |
|---|------|
| b) Briefly describe the Object class in java. | 2.25 |
| c) What are the conditions for a class to become abstract? Can you declare an object of abstract class? | 2 |

- | | | |
|-------|---|------|
| 4. a) | Discuss how try-catch-finally block works in java. | 3 |
| b) | How can you define your own exception type in java? | 2.5 |
| c) | What are the difference between InputStream class and Reader class? | 1 |
| d) | Write a simple java program to copy content of a text file into another file. | 2.25 |

Part -B

- | | | |
|-------|--|------|
| 5. a) | What is thread? Discuss java thread model. | 3.25 |
| b) | Write a program to demonstrate the creation and execution of threads. How can you ensure all threads that started from main must end in order in which they started and main should end in last? | 2.5 |
| c) | What is "Instance Variable Hiding" problem? How this problem can be resolved? | 3 |
| 6. a) | With suitable block diagram explain Delegation Event Model in java. | 3 |
| b) | Why is swing preferable for GUI programming over AWT? | 2 |
| c) | What are the purpose of event Adapter classes? | 1 |
| d) | Describe shortly how to achieve the following GUI layout. (Which layouts are used, how they are nested?) | 2.75 |



- | | | |
|-------|--|------|
| 7. a) | What is Dynamic binding? Show with an example how dynamic binding works. | 2 |
| b) | What are Java packages? What is the significance of packages? | 3 |
| c) | Design a Java package for numbers. Develop two different classes that belongs to two package, one for to check whether the given number is palindrome or not and the other to check whether the given number is odd or even and access these package using one main file | 3.75 |
| 8. a) | What do you mean by "design pattern" in OOP? How are they useful? | 2 |
| b) | With appropriate example and class diagram explain the Abstract Factory Design Pattern. | 5 |
| c) | Which design pattern will you use to make sure only one instance of an object is created and reused during the execution cycle of a java program? Explain. | 1.75 |

University of Rajshahi
Department of Computer Science and Engineering
B. Sc. Engg. Part1 Even Semester, Examination-2018 (Session 2016-17)
Course: CSE-1221 (Object Oriented Programming with C++)

Full Marks: 52.5

Time: 3 Hours

5.2.5 [Answer any six questions taking three from each Section]

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SECTION A

- | | | |
|----|---|------|
| 1. | a) Briefly describe the key features in object oriented programming language? | 3.75 |
| | b) Shortly describe the purpose of C++ namespace. | 3 |
| | c) Define C++ class and objects. | 2 |
| 2. | a) How can you define the access rights for the members of a class? Write a simple C++ program using various access specifiers. | 3.75 |
| | b) What are the purposes of constructor and destructor functions? | 3 |
| | c) What is copy constructor in C++? | 2 |
| 3. | a) How can you give permission to a nonmember function access to the private members of a class? | 4.75 |
| | b) Write down the usefulness of friend function. | 2 |
| | c) How can you open and close a file in C++ program by using different types of streams? | 2 |
| 4. | a) Write a fragment of program that overload member operator function (+). | 3 |
| | b) How can you create prefix and postfix forms of the increment and decrement operators? | 3 |
| | c) Friend operator functions add flexibility. Discuss with example. | 2.75 |

SECTION B

5. a) Define base class and derived class. Do base class and derived class have any specific purpose in C++ programming language to achieve any key feature in Object Oriented Programming? Explain with C++ code. 5.75

- b) Are the protected members of a base class accessible by a derived class when the base class is inherited as public? 3

6. a) Write the output of the following C++ program. 4

```
#include <iostream>
using namespace std;
class base {
public:
    base() { cout << "Constructing base\n"; }
    ~base() { cout << "Destructing base\n"; }
};
class derived: public base {
public:
    derived() { cout << "Constructing derived\n"; }
    ~derived() { cout << "Destructing derived\n"; }
};
int main() {
    derived ob;
    return 0;
}
```

- b) What is the purpose of using virtual base class? 2.75

- c) What is exception handling? 2

7. a) How can we create initialized and uninitialized array of objects by overloading constructor function? Give example with C++ code. 4.75

- b) Explain the use of pointer in C++. What do you mean by 'this' pointer? 4

8. a) What is generic function? Write the general form of a template function definition. 2

- b) Can you mix standard parameters with generic type parameters in a template function? Explain. 3

- c) Write the use of width(), precision() and fill() member functions with example. 3.75

Part A

1. (a) Write some features of OOP. 2
- (b) Differentiate between structure and class with an example. 1.75
- (c) What is local class? What are the restrictions of local classes? Discuss with example. 3
- (d) Is it possible to return an object from a function? If possible, how? 2
2. a) Is it possible to have arrays of objects? If possible, how? 2
- b) What is 'this pointer'? Explain. 2
- c) Define inline function. Discuss about the restrictions with inline function. 3
- d) How can you allocate objects dynamically? 1.75
3. a) What is constructor overloading? What are the reasons to overload a constructor? 2.75
- b) Why overloading sometimes causes ambiguity? Describe with example. 3
- c) What is default argument? What are the advantages of default arguments? Give example. 3
4. a) Explain different types of inheritance with block diagram and examples. 3.5
- b) What is the ambiguity that arises in multiple inheritance? How it can be overcome? Explain with example. 2.5
- c) Discuss the implications of deriving a class from an existing class by the 'public' and 'protected' access specifiers with examples. 2.75

Part B

5. (a) Why is constructor functions executed in order of derivation? 1
- (b) How do you pass arguments to a constructor in a base class? Discuss with example. 4
- (c) Briefly discuss virtual base class with an example. 3.75
6. (a) 'The virtual attribute is inherited' - explain it with an example. 2.75
- (b) What is a pure virtual function? Discuss it with an example. 3
- (c) Differentiate between early binding and late binding. 3
7. (a) How can you define more than one generic data type in the template function? Explain with an example. 2
- (b) Can you mix standard parameters with generic type parameters in a template function? Explain. 2
- (c) Is it possible to catch a class type? Explain. 2.75
- (d) How can you restrict the type of exceptions that a function can throw outside of itself? 2
8. (a) List and explain in brief the various functions required for random access file operations. 3.5
- (b) How do 'endl' and 'setw' manipulators work? Illustrate with example. 2.5
- (c) What is the difference between opening a file with constructor function and opening a file with 'open()' function? 2.75

Part-A

1. a) What is object-oriented programming? How are data and functions organized in an object-oriented program? 3
- b) What kind of things can become an object in OOP? 1.75
- c) Distinguish between the following terms: 3
- i) Inheritance and polymorphism
- ii) Objects and classes
- d) What is meant by data binding? 1
2. a) How we can run our C++ program without header files? 1.75
- b) Describe the major parts of a C++ program. 3
- c) How can you create an initialized array of objects? 2
- d) What is new and delete? What are their advantages? 2
3. a) Briefly discuss copy constructor with an example. 4
- b) Write some ambiguities of function overloading. 2.75
- c) What is a constructor? What is wrong with the constructor shown in the following fragment? 2
- ```
class sample {
 double a, b, c;

public:
 double sample();
};
```
4. a) How does binary operator operate? Give an example. 3
- b) How can you create prefix and postfix forms of the increment and decrement operators? 2.75
- c) Write a fragment of program that overloads friend operator function (-). 3

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5. a) What are the different forms of inheritance? Give an example of each. 4.75
- b) In what order are the class constructors called when a derived class object is created? 2
- c) Consider the following code: 2
- ```
class B {};  
class D1 : public B {};  
class D2 : public B {};  
class DD : public D1, public D2 {};
```
- How can you prevent the creation of two copies of base class B in a DD object? 2
6. a) How is polymorphism achieved at (a) compile time and (b) run time? 2
- b) When do we make a virtual function "pure"? What are the implications of making a function a pure virtual function? 3
- c) How could we specify the types of objects a function can throw? 2
- d) When should a function throw an exception? 1.75

7. a) What is exception handling? Write the general form of exception handling. 3
b) Is it possible to write a try block inside a function? Explain. 2
c) Write the use of width(), precision() and fill() member functions with example. 3.75
8. a) How can you read from and write to a text file? Discuss. 3
b) Briefly discuss getline() function with example. 2
c) Shortly discuss random access from a file with example. 3.75

== ☺ ==