

National University of Computer and Emerging Sciences, Lahore Campus



Course:	Advanced Programming	Course Code:	CS433
Program:	BS (Computer Science)	Semester:	Fall 2018
Duration:	180 Minutes	Total Marks:	48
Paper Date:	03-Jan-19	Weight	48 %
Section:	All	Page(s):	12
Exam:	Final		

Instruction/Notes:

Attempt the examination on the question paper and write concise answers. You can use extra sheet for rough work. Do not attach extra sheets used for rough with the question paper. Don't fill the table titled Questions/Marks.

Question	Objective	1	2	3	4	Total
Marks	/ 16	/ 16	/ 7	/ 5	/ 4	/ 48

Section 1 (Objective part) [points 16]

Clearly circle the correct options.

Q1. In JAVA RMI, the objects are passed by Value or Reference?

- A) Objects are passed by value and reference
- B) Objects are passed by Reference
- C) Objects are passed by value
- D) None

Q2. Given the following piece of code, which fragments will compile?

```
public interface Base {
    boolean m1();
    byte m2(short s)
}
```

- A) interface Base2 implements Base {}
- B) abstract class Class2 extends Base { public boolean m1(){ return true; }}
- C) abstract class Class2 implements Base {}
- D) abstract class Class2 implements Base { boolean m1(){ return (7 > 4); }}
- E) abstract class Class2 implements Base { private m1(){ return (5 > 7) } }

Q3. Which of the following is benefit of MVC?

- A) Loose Cohesion
- B) Loose Coupling
- C) Better Performance.
- D) Less Defects.

Q4. What will be the output of the program?

Department of Computer Science

Name: _____

```
class TestOperators {
    public static void main(String [] args) {
        int x = 11 ^ 9;
        int y = x | 4;
        System.out.println(y>>1);
    }
}
```

- (A) 0 (B) 3 (C) 6 (D) 12

Q5. Given the following piece of code, which answer most closely indicates the behavior of the program?

```
public class TestException {
    public static void raiseException() {
        throw new RuntimeException();
    }
    public static void main(String args[]) {
        try {
            System.out.println("FAST");
            raiseException();
            System.out.println("After Throw");
        }
        finally {
            System.out.println("Finally");
        }
    }
}
```

(A) The program will print FAST, then will print Finally, then will print that a RuntimeException has occurred.

(B) The program will print FAST, then will print that a RuntimeException has occurred, then will print After throw, and then will print Finally.

(C) The program will print FAST, then will print that a RuntimeException has occurred, and then will print Finally.

(D) The program will not compile.

Q6. We can prevent serialization using keyword?

- a) volatile b) final c) transient d) synchronized

Q7. Given the following piece of code, which answer most closely indicates the behavior of the program?

```
class Base {
    public final void show() {
        System.out.println("Base::show() called");
    }
}
class Derived extends Base {
    public void show() {
        System.out.println("Derived::show() called");
    }
}
```

- a) Derived::show() called
 b) Base::show() called
 c) Exception
 d) Compiler Error

```
    }
    public class Main {
        public static void main(String[] args) {
            Base b = new Derived();
            b.show();
        }
    }
```

Reg #:

Section:

Q8. What temporarily redirects response to the browser?

- a) <jsp:forward> b) <%@directive%> c) response.sendRedirect(URL) d) response.setRedirect(URL)

Q9. Which of the following is not an inheritance mapping strategies in Hibernate?

- a) Table per hierarchy b) Table per concrete class c) Table per subclass d) Table per class

Q10. In which file database table configuration is stored?

- a) .dbm b) .hhm c) .ora d) .sql

Q11. Which of this access specifies can be used for a class so that its members can be accessed by a different class in the same package?

- a) Public b) Protected c) No Modifier d) All of the mentioned

Q12. What does setAutoCommit(false) do?

- a) commits transaction after each query
 - b) explicitly commits transaction
 - c) does not commit transaction automatically after each query
 - d) never commits transaction

Q13. In RequestDispatcher which method is used to sends the same request and response objects to another servlet?

- (A) forward() (B) sendRedirect() (C) Both A&B (D) None of the options

Q14. Which of these statements is incorrect about Exception Handling?

- (A) try block need not to be followed by catch block.
 - (B) try block can be followed by finally block instead of catch block.
 - (C) try block can be followed by both catch and finally block.
 - (D) try block must be followed by catch block.

Q15. How many components can be displayed using a BorderLayout?

Q16. Which classes are used for connection-less socket programming?

- A) Socket B) DatagramPacket C) ServerSocket D) DatagramSocket

Section 2 (Subjective part) (marks 32)

Question No. 1 [16 Marks]

Answer the following questions. (Not more than 2-3 lines)

- a) Can an abstract method be static in Java? Explain with reason.

No, because static methods are at class level so they cannot be overridden so we make a method abstract to override it.

- b) In JSP page how can we handle runtime exception/ errors? Write simple code using page directive. [2 marks]

<%@ errorpage="errorPage.jsp" %>

</> isError = "true" ~~isError~~
throws new Runtimeexception "Error"

-f7

- c) What will happen when you attempt to compile and run the following code? Justify your answer.

```
public class MyClass{
    int i=0;
    public static void main(String argv[]){
        MyClass obj = new MyClass();
        obj.doNotify();
    }

    public void doNotify(){
        while(true){
            try{
                obj.notify();
            }catch (InterruptedException e) {}
        }
    }
} //End of class
```

Compile
true error

d) What is the output of the following programs:

```
class MineAlone{
    int a = 1, b = 3;
    public static void main(String args[]){
        System.out.println(a + b);
    }
}
```

Ans:

Compile time error.

e) Can you create a sub class to the following class? Give reason for your answer.

```
class A {
    private A(){
        //First Constructor
    }

    private A(int i){
        //Second Constructor
    }
}
```

Ans:

No, because default constructor is private.

f) Can we change the state of an object to which a final reference variable is pointing? Explain your answer.

Ans:

*Yes we can for eg.
→ final List<int> li = new ArrayList<int>;*

g) Change the divide method so that it throws an `IllegalArgumentException` with an appropriate message if b is zero.

```
public static double divide(double a, double b) {
    return a/b;
}
```

Solution:

*public static double divide(double a, double b)
if (b==0)
 throws new IllegalArgumentException()
return a/b;*

Name: _____

- h) What will be the result of attempting to compile the following program?

```
public class MyClass {
    long var;
    public void MyClass(long param) { var = param; }
    public static void main(String[] args) {
        MyClass a,b;
        a = new MyClass();
        System.out.println(var);
        b = new MyClass(5);
    }
}
```

Solution:

compile time error

nodefault constructor

not accessible

- i) What is the benefit of using the @Override annotation?

- would help identify compile time error
- & what exact function we are overriding

- j) RMI: Fix one conceptual error (runtime error) in the following program.

```
import java.rmi.*;
import java.rmi.server.*;
public class MainServer {
    public static void main(String args[]) {
        try {
            ServerImpl serverObj = new ServerImpl();
            String ip = "localhost";
            String service_address = "http://" + ip + "/myService";
            Naming.rebind(service_address, serverObj);
        } catch (Exception e) {
            System.err.println("Error - " + e);
        }
    }
}
```

Solution:

only interface

type reference

Fix:

Server ServerObj =

new ServerImpl()

- k) What is difference between SQL and HQL?

Structured Query language

dependent on type of DB we are using

Hibernate Query language

*- wrapper over SQL
- platform independent
- same for all*

In Hibernate configuration file, define a mapping from a java class ("com.nu.Customer") to the database table named "Customer". Also define mapping for Java class properties ("name", "status") to the corresponding columns in the database table. [2 marks]

< hibernate-mapping class="com.nu.Customer" >

table-name = "abc-Customer" >

< property-name = "name" >

< property-name = "status" >

> hibernate-mapping

m) If you create a multi-threaded application with 5 threads: [2 marks]

i) How many STACKS and HEAPS will be created?

1 Heap 5 Stacks

ii) Which of the followings will be stored on STACK:

- a) Local variables
- b) References to objects
- c) Objects
- d) instance variables
- e) class variables (static)
- f) String str = "abc";

Question No. 2 Threads Synchronization [5 + 2 points]

inference
n) Code

a) Write a Java application program that creates N threads. Each thread takes an ArrayList of strings and a shared HashMap as its arguments. Each thread processes his ArrayList, updates the shared HashMap and terminates. HashMap keys are distinct strings on the list and its values are the number of occurrences of those strings. For example, if the argument is the ArrayList ["ABE", "JFK", "DCA", "JFK", "JFK", "ABE", "DCA", "HHN"] then the updated HashMap should be ["ABE"=2, "JFK"=3, "DCA"=2, "HHN"=1]. getKeys getValues.

The last thread to terminate iterates and prints the keys and values of the shared HashMap.

The default value of N is 10 and it may be changed by specifying the new value as a command line argument. (Write complete code and use synchronization where necessary.)

↓
Threads

public class Count extends Thread {

~~Count~~ → ArrayList<String> s1;
HashMap<String, Int> h2;

Count(ArrayList<String> s2, HashMap<String, Int> h2)
{

 s1 = s2; h2 = h2;

 public void run() {

 for (String s : s1) { synchronized (h2) {

 if (!h2.contains(s)).

 h2.put(s, 1);

 else

 h2.put(s, h2.get(s)+1);

 } // end of block.

 } // end of for loop.

} // end of run method

public static void main (String [] args) {

 int N = 10;

 if (args.length() != 0)

 N = Integer.parseInt(args[0]);

 ArrayList<String> s2 = new ArrayList<String>();

 // assuming data has been put into each
 arraylist

 for (int i = 0; i < N; i++)

 new Count(s2[i], h2).start();

 String [] s3 = h2.keySet();

 for (String str : s3) {

 System.out.println("Key: " + str + " value: " + h2.get(str));

} // end of main

} // end of class.

- b) For the example code given below, determine whether it has any synchronization-related problems. Justify your answer. (There may be more than one kind of problems.) Q

Silly sum: Calling doCount() in the following class attempts to add the numbers 0 through 99.

```

class Parent {
    int n = 0, sum = 0;
    class Child extends Thread {
        synchronized public void run() {
            while (true) {
                while (n == 0) {
                    try { wait(); } catch (InterruptedException e) {}
                }
                sum += n;
                n = 0;
                notifyAll();
            }
        }
    }
    synchronized public void doCount() throws Exception {
        Child childObj = new Child();
        childObj.start();
        for (int i=0; i<100; i++) {
            n = i;
            notifyAll();
            while (n != 0) {
                try { wait(); } catch (InterruptedException e) {}
            }
        }
        System.out.println("Sum is " + sum);
    }
}

```

Ans:

~~Wait and notifyAll are not being used in associated functions with an object AND~~

~~the notifyAll should be synchronized~~

~~There's a deadlock as the code logic is not written correctly~~

(2)

Question No. 3 STRUTS and JSP [4 Marks]:

We are given Action class "LoginAuthenticate" as given below. Fix the errors in the LoginAuthenticate class. When the user submits a request (user_name) to "authenticate" action, the execute method of LoginAuthenticate is executed. If user_name is "admin", the request should be sent to "success.jsp", otherwise it should be sent to error.jsp. Use <jsp:usebean> tag and its get and set properties to get and set user_name. Moreover, also write the action mapping with required <result> tags.

```

package samples;
public class LoginAuthenticate {
    private String user_name;
    // write the code for action class here
    void set_user_Name(String a)
    {
        this.user_name = a;
    }
    String get_userName()
    {
        return this.user_name;
    }
    String execute()
    {
        if(this.user_name equals to
            ("admin"))
            return "true";
        else
            return "false";
    }
    //end body of LoginAuthenticate class
}

```

//Write <jsp:usebean> usage code here
 // define a page level bean to get and set "user_name".

```

<jsp:usebean id="obj1"
    class="samples.LoginAuthenticate"
    scope="page" />
<!-- jsp:getproperty
    name="obj1"
    property="user_name" /-->
<!-- jsp:setproperty
    name="obj1"
    property="user_name"
    value="admin" /-->

```

//Write STRUTS action mapping and <result> tag here (struts.xml). Write "authenticate" as action for samples.LoginAuthenticate class.

```

<action name="Hello"
    action-class="samples.LoginAuthenticate"
    <!-- default-name="true" --> success.jsp
    <result-name="false">error.jsp </result>

```

Actions

Name: _____ Reg #: _____ Section: _____

Question No. 4 Servlet [5 Marks]

Write Servlet code that processes the following form:

```
<form action="myServlet" method="post">
<fieldset>
<input type="text" name="name" /> Name <br />
<input type="text" name="pw" /> Password <br />
<input type="text" name="cc" /> Credit Card Number <br />
<input type="submit" />
</fieldset>
</form>
```

Your code should examine the name, password, and credit card number submitted, and verify that they are valid.

A valid name is any non-empty string. A valid password is any string that is at least 6 characters long. A valid credit card number contains exactly 16 digits. Optionally, the credit card number can contain dashes between all groups of four digits. No other characters may be part of a credit card number.

Your Server side code's output should be a level-1 heading stating whether the data was valid or invalid, and a paragraph containing the data itself separated by commas. Replace the password by a string of * characters of equivalent length. Strip any dashes out of the credit card number while displaying it. For example, here are some outputs of your script:

Form Input	Output
name: Ahmad pw: abcd12! cc: 1234-5678-1234-5678	Successful. Ahmad, ***** , 1234567812345678
name: Ali pw: sky cc: 11112222-33334444	Denied! Invalid data. Ali, *** , 1111222233334444

Solution:

```

import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

public class myServlet extends HttpServlet throws
    ServletException, IOException
{
    protected void doPost(HttpServletRequest req, HttpServletResponse res)
    String name = req.getParameter("name");
    String pwd = req.getParameter("pwd");
    String cc = req.getParameter("cc");
    cc.replace(" ", ""); // removing dashes.
    for (int i=0; i<pwd.length(); i++)
        pwd.replaceAt(i, '*'); // replacing password
    boolean bool1, bool2, bool3;
    if (name.length() <= 0)
        bool1 = true;
    if (pwd.length() < 6)
        bool2 = true;
    for (int i=0; i<cc.length(); i++)
        if (cc.charAt(i) < '0' || cc.charAt(i) > '9')
            bool3 = true;
    if (cc.length() != 16)
        bool3 = true;
    // best of luck
    Good Luck
}

```

~~res. setContentType ("text/html");
PrintWriter out = res.getWriter();~~

String s = name + "," + pwd + "g" + cc;
try {
 if (bool1 || bool2 || bool3)
 out.println(
 "

Denied & Invalid Data

");
 };
else
 out.println(
 "

Successful

");
}
out.println("<p>" + s + "</p>")
};
finally { out.close(); }
};
};
};
};
};