

National University of Computer and Emerging Sciences, Lahore Campus

Course: Advanced Programming
Program: BS (Computer Science)
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Section: All
Exam: Final

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Total Marks: 48
Weight: 48 %
Page(s): 12

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?

```

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?

<pre> 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"); } } </pre>	<p>a) Derived::show() called</p> <p>b) Base::show() called</p> <p>c) Exception</p> <p>d) Compiler Error</p>
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<pre> } } public class Main { public static void main(String[] args) { Base b = new Derived(); b.show(); } } </pre>	
---	--

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) .hbm c) .ora d) .sql

Q11. Which of this access specifier 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 send 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?

- (A) 3 (B) 1 (C) 4 (D) 5

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

Ans:

- 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:

- 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:

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

Ans:

- 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:

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:

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

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:

k) What is difference between SQL and HQL?

- l) 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]**
- m) If you create a multi-threaded application with 5 threads: **[2 marks]**
- i) How many STACKS and HEAPS will be created?
 - 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]

- 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].
- 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.*)

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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.)

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:

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
```

```
} //end body of LoginAuthenticate class
```

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

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

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:

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Good Luck 😊