Paper Code: IC-2417

M. Sc (Informatics)-Sem. II, 2017
Paper: IT-24- Programming Languages

Time: 3hrs.

Max. Marks: 75

(Write your Roll No. on the top immediately on receipt of this question paper)

Q 1 is compulsory.

Attempt any 4 questions from Q2 to Q6.

Q1.

a. Provide output: (5)

```
interface IStack {
            void push(Object item);
            Object pop();
}
interface ISafeStack extends IStack {
            boolean isEmpty();
            boolean isFull();
}
class StackImpl implements IStack {
            // Assume Implementation
}
class SafeStackImpl extends StackImpl implements ISafeStack {
         // Assume Implementation
}
public class Identification {
  public static void main(String[] args) {
    Object obj = new Object();
    StackImpl stack = new StackImpl(10); // Assume constructor implemented
    SafeStackImpl safeStack = new SafeStackImpl(5);
    IStack iStack;
    System.out.println("(1): " + (null instanceof Object));
    System.out.println("(2): " + (null instanceof IStack));
    System.out.println("(3): " + (stack instanceof Object));
    System.out.println("(4): " +  (obj instanceof StackImpl));
    System.out.println("(5): " +  (stack instanceof StackImpl));
    System.out.println("(6): " +  (obj instanceof IStack));
    System.out.println("(7): " +  (safeStack instanceof IStack));
    obj = stack;
    System.out.println("(8): " +   (obj instanceof StackImpl));
    System.out.println("(9): " +    (obj instanceof IStack));
    System.out.println("(10): "    (obj instanceof String));
    iStack = (IStack) obj;
    System.out.println("(11): "  +  (iStack instanceof Object));
    System.out.println("(12): " +  (iStack instanceof StackImpl));
    String[] strArray = new String[10];
    System.out.println("(14): " +  (strArray instanceof Object));
    System.out.println("(15): " +  (strArray instanceof Object[]));
    System.out.println("(16): " +   (strArray[0] instanceof Object));
    System.out.println("(17): " +  (strArray instanceof String[]));
    strArray[0] = "Amoeba strip";
    System.out.println("(18): " +   (strArray[0] instanceof String));
  }
}
```

b. Give the following code: **(4)**

```
                public enum Direction {
                        EAST, WEST, NORTH, SOUTH;
                        public static void main (String[] args) {
                                // (1) INSERT LOOP HERE
                        }}
```

Which loops, when inserted independently at (1), will give the following output:

EAST
WEST
NORTH
SOUTH

c. Which of these array declaration statements are not legal? Select two correct answers. **(3)**

```
A.  int[] i[] = { { 1, 2 }, { 1 }, {}, { 1, 2, 3 } };
B.  int i[] = new int[2] {1, 2};
C.  int i[][] = new int[][] { {1, 2, 3}, {4, 5, 6} };
D.  int i[][] = { { 1, 2 }, new int[ 2 ] };
E.  int i[4] = { 1, 2, 3, 4 };
```

d. Provide the output of following program? **(3)**

```
public class Init {   initme
        String title;
        boolean published;
        static int total;
        static double maxPrice;
        public static void main(String[] args) {
                Init initMe = new Init();
                double price;
                if (true)
                        price = 100.00;
                System.out.println("|" + initMe.title + "|" +
initMe.published + "|" +
                        Init.total + "|" + Init.maxPrice + "|" +
price+ "|");
        }
}
```

Q2.

a. Explain how object oriented principles polymorphism, encapsulation and inheritance work together? Given that Thing is a class, how many objects and how many reference variables are created by the following code? **(5)**

```
        Thing item, stuff;
        item = new Thing();
        Thing entity = new Thing();
```

b. Mention three restrictions that are applied to methods declared as static? Which one of following do not denote a primitive data values in Java? Select two correct answers. **(3)**

```
(a) "t"
(b) 'k'
(c) 50.5F
(d) "hello"
(e) false
```

c. What are variable arity methods? Write the rules for creating variable arity methods? Give example of ambiguities when using variable arity methods? Which of these method declarations are valid declaration of main() methods? Select three correct answers. **(5)**

(a) static void main(String[] args) { /* ... */ }
(b) public static int main(String[] args) { /* ... */ }
[✓ (c) public static void main(String args) { /* ... */ }]
[✓ (d) final public static void main(String[] arguments) { /* ... */ }]
(e) public int main(Strings[] args, int argc) { /* ... */ }
(f) static public void main(String args[]) { /* ... */ }
[✓ (g) static public void main(String... args) { /* ... */ }]

d. Write the significance of finalize method with respect to automatic garbage collection? **(2)**

Q3.

a. What is Dynamic Method Dispatch? Give example. What will the output of compiling and running following program? **(5)**

```
public class MyClass {
        public static void main(String[] args) {
                C c = new C();
                System.out.println(c.max(13, 29));
        }
}
class A {
        int max(int x, int y) { if (x>y) return x; else return y; }
}
class B extends A{
        int max(int x, int y) { return super.max(y, x) - 10; }
}
class C extends B {
        int max(int x, int y) { return super.max(x+10, y+10); }
}
```

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b. When a class hierarchy is created, in what order are the constructors for the classes that make up the hierarchy executed? Provide the output of following program? **(5)**

```
public class MyClass {
        public static void main(String[] args) {
                B b = new B("Test");
        }
}
class A {
        A() { this("1", "2"); }
        A(String s, String t) { this(s + t); }
        A(String s) { System.out.println(s); }
}
class B extends A {
        B(String s) { System.out.println(s); }
        B(String s, String t) { this(t + s + "3"); }
        B() { super("4"); };
}
```

c. Complete following table for Java access control: **(3)**

	Private	No Modifier	Protected	Public
Same class				
Same Package Subclass				
Same Package Non-Subclass				
Different package subclass				
Different package non-subclass				

d. What is static import? Which statements, when inserted at (1), will result in a program that prints 7, when compiled and run? **(2)**

```
// (1) INSERT ONE IMPORT STATEMENT HERE
public class RQ700_20 {
        public static void main(String[] args) {
                System.out.println(sqrt(49));
        }
}
```

Q4.

a. How exception handling is done in Java? Provide the output of following program? **(5)**

```
public class MyClass {
        public static void main(String[] args) {
                int k=0;
                try {
                        int i = 5/k;
                } catch (ArithmeticException e) {
                        System.out.println("1");
                } catch (RuntimeException e) {
                        System.out.println("2");
                        return;
                } catch (Exception e) {
                        System.out.println("3");
                } finally {
                        System.out.println("4");
                }
                System.out.println("5");
        }
}
```

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b. Drawn and explain thread state transition diagram? **(3)**

c. What are Deadlocks? Give example how deadlocks can occur in multithread programming? **(3)**

d. What is need of synchronization in multithread programming? Write two ways to achieve synchronization in java? **(4)**

Q5.

a. Explain different type of streams supported in Java? Briefly explain significance of following code snippet? **(5)**

```
BufferedReader br = new BufferedReader(new
                        InputStreamReader(System.in));
```

b. What are Lambda expression and functional interface? Provide the output of following program? **(5)**

```
interface MyNumber {
        double getValue();
}
class LambdaDemo {
        public static void main(String args[])
        {
                MyNumber myNum; // declare an interface reference
                myNum = () -> 123.45;
                System.out.println("A fixed value: " +
myNum.getValue());
        }
}
```

c. What is automatic resource management in Java? Explain with example? (2)

d. What is serialization in java? What is impact of serialization on class members having transient modifier? (3)

Q6.

a. Differentiate between servlets and applets? (2)

b. What is Autoboxing? Write its advantages? Provide output of following? (5)

```
public class Hello {
        public static void main(String[] args) {
                Integer i = new Integer(-10);
                Integer j = new Integer(-10);
                Integer k = -10;
                System.out.print(i==j);
                System.out.print(i.equals(j));
                System.out.print(i==k);
                System.out.print(i.equals(k));
        }
}
```

c. What are Generics? Write its impacts in Java programming? (3)

d. Explain automatic garbage collection in Java? Identify the location in the following program where the object, initially referenced with arg1, is eligible for garbage collection? (5)

```
public class MyClass {
        public static void main(String[] args) {
                String msg;
                String pre = "This program was called with ";
                String post = " as first argument.";
                String arg1 = new String((args.length > 0) ? "'" +
args[0] + "'" :
                                "<no argument>");
                msg = arg1;
                arg1 = null; // (1)
                msg = pre + msg + post; // (2)
                pre = null; // (3)
                System.out.println(msg);
                msg = null; // (4)
                post = null; // (5)
                args = null; // (6)
        }
}
```