Sample Exam Questions:
Ques 1 – 10 points
Consider the following code:

```
public class mySet {
    ArrayList myElements = new ArrayList( );

    public boolean add( Object o ) {
         myElements.add( o );
    }

    public Object remove( ) {
         if (myElements.isEmpty( ) == false)
            return myElements.remove( 0 );   // removes & returns object at
position 0
         return null;
    }
}
```

a. What may happen if an object of the class mySet is used by multiple threads calling add( ) and remove( ) at the same time?
b. Change the add( ) and remove( ) methods so that the class mySet can be safely used by multiple threads at once.
c. Change the add( ) and remove( ) methods so that the method remove( ) will always return an object when used by multiple threads (by waiting until an object has been added).

Ques 2 – 10 points

The following program contains code to handle different kinds of exceptions. Read it carefully in order to answer the questions that follow.

```
public class Exceptional {
    public static void main(String args[]) {
        int w,x,y,z;
        w = x = y = z = -1;
        try {
            int[] someData = {0, 6, 2, 3};
            int[] myArray = null;
            int[] noData = {};
            System.out.println("Test 1:");
            w = foo(myArray, 2);
            System.out.println("Test 2:");
            x = foo(someData, 3);
            System.out.println("Test 3:");
            y = foo(someData, 5);
            System.out.println("Test 4:");
            z = foo(noData, 0);
        } catch (Exception e) {
            System.out.println("Hmmm... what happened?");
        }
        System.out.println("w="+w + "  x="+x + "  y="+y + "  z="+z);
    }

    public static int foo(int[] a, int n) throws Exception {
        int result = 0;
        try {
            for (int i = 0; i < n; i++)
               result += a[i];
            result /= a.length;
        } catch (ArrayIndexOutOfBoundsException aioobe) {
            System.out.println("Oops!");
        } catch (NullPointerException npe) {
            System.out.println("Oh, my goodness!");
        } catch (ArithmeticException ae) {
```

```
                System.out.println("Bad news.");
                throw ae;
            } finally {
                System.out.println("result = " + result);
            }
            return result;
        }
    }
```

a. Provide the output that would result from executing the above program.
b. Suppose the line `return result;` was moved into the finally clause just after the println statement. Would the output be different? If so, write how it would differ. If not, explain why not.

Ques 3 – 10 points

Instantiate an object of this class and show how you would run the code below? Explain what the code does and what will it print out.

```
public class Test1 extends Thread {

    private int tick = 1;
    private int num;

    public Test1 (int num) {
        this.num = num;
    }

    public void run() {
        while (tick < 400000) {
            tick++;
            if ((tick % 50000) == 0)
                System.out.println("Thread #" + num + ", tick = " + tick);
        }
    }
}
```

```
Write code to instantiate four threads allowing each thread to complete the run methods
in order of thread number. i.e. Thread 1 completes first, followed by second, third and
so on.
```

Ques 4 – 10 points

a. What is synchronization?
b. What are Java locks?
c. Why should programs avoid deadlocks?
d. What is the effect of invoking the wait( ) method?

Ques 5 – 10 points

1. Classes in the Java Collection Framework support generic types in Java 1.5. Show how to modify the following code to declare a TreeSet class for Doubles using generics, then add & get a Double object from the TreeSet.

```
// previously
TreeSet mySet = new TreeSet( );
mySet.add( new Double(1.0) );
Double d = (Double) mySet.get(0);

// new code using generic types
```

Ques 6– 10 points

Suppose in Java you had the following class hierarchy:

```
class A {}
class B extends A {}
class C extends B {}
class D extends A {}
class E extends D {}
```

and suppose you had the following overloaded method definitions:

```
static void f(A a, D d) {}
static void f(B b, A a) {}
static void f(C c, D d) {}
```

Now consider the following invocations of f:

```
f(new A(), new E());
f(new C(), new A());
f(new C(), new E());
f(new B(), new D());
```

For each of these invocations, explain which f is called and why, or, if a call represents an error, explain why it is an error and whether the error is reported by the compiler or the runtime system.

Ques 7 – 10 points

Create an exception class (**NotAlphaNumeric**) using the extends keyword. Write another class Myfile that throws the exception when its constructors gets a filename that is either numeric or just contains alphabets. Write a method that will exercise your exception by creating an object of type Myfile with names that contain numbers only, alphabet only and alphanumeric characters.