



UNIVERSITY of LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE of INFORMATICS *and* ELECTRONICS

Department of Computer Science
and Information Systems

Repeat Examination Paper

Academic Year:	2006/07	Semester:	Semester 2
Module Title:	Software Testing and Inspection	Module Code:	CS4004
Duration of Exam:	2½ Hours	Percent of Total Marks:	100
Lecturer(s):	McElligott & Power	Paper marked out of :	100

Instructions to Candidates:

Section A: ALL 3 questions should be attempted in this section.

Section B: You are expected to attempt **2** questions from this section. You cannot receive marks for answering different parts of more than 2 questions.

State clearly any assumptions you make.

Section A (Three questions)

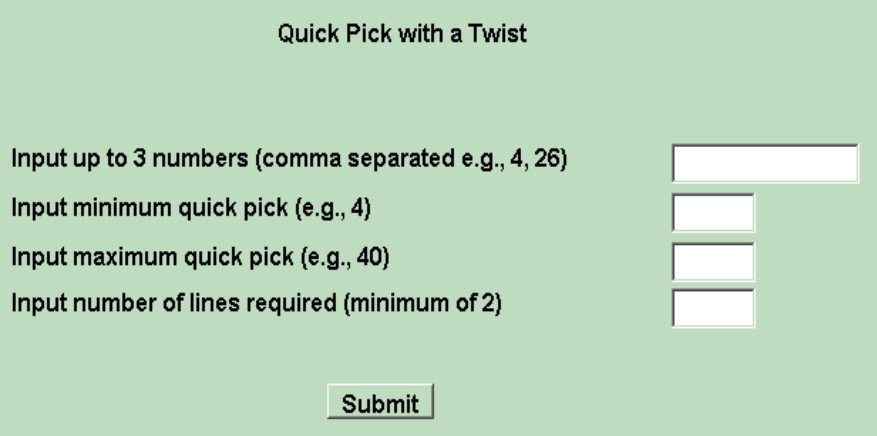
Q1 Functional Testing (20 marks)

To enter the National Lottery Draw a person has a choice of using his/her own numbers or opting for a quick pick of random numbers chosen by the system. The National Lottery has proposed introducing Quick Pick with a Twist (cf. Figure 1) which works as follows:

- The user must enter up to 3 numbers of his/her own choosing.
- The system then selects random numbers subject to a minimum value selected by the user and a maximum value selected by the user.
- If the user does not choose a minimum or a maximum the default limits of 1 and 45 are used, respectively.
- The user must purchase at least 2 lines up to a maximum of 8.
- Each line of lines (of six numbers) output will include the lucky numbers supplied by the user.

You are required to design test cases for this system using equivalence classes and boundary value analysis. The test cases should be documented as follows:

- (i) for each **equivalence class** you create you should specify its number, its description, whether it is valid/invalid and provide an example.
- (ii) a table specifying for each **test case** its number, the test case (i.e., the input values), whether the test case is valid or invalid, the classes covered (including boundaries if any), and the expected outcome.



Quick Pick with a Twist

Input up to 3 numbers (comma separated e.g., 4, 26)

Input minimum quick pick (e.g., 4)

Input maximum quick pick (e.g., 40)

Input number of lines required (minimum of 2)

Figure 1

Q2 Structural Testing (20 marks)

- Write test cases to achieve 100% statement coverage of the program shown in Figure 2 below. For each test case you should write its test case number, its description and expected outcome.
- Draw a Control Flow Graph (CFG) for this program.
- Using your CFG write sufficient test cases to achieve
 - 100% decision/branch coverage and
 - 100% condition coverage.

For each test case you should write its test case number, its description and expected outcome. In addition you should state whether a particular test case concerns decision/branch testing or condition testing.

```
1 import javax.swing.JOptionPane;
2 public class RandomDuplicates
3 {
4     public static void main(String[] args)
5     {
6         int[] numbers = new int[10];
7         int i, j = 0;
8         boolean duplicatesFound = false;
9         String results = "";
10        for (i = 0; i < numbers.length; i++)
11        {
12            numbers[i] = (int) (Math.random() * 31 + 20);
13            results += numbers[i] + "\n";
14        }
15        for (i = 0; i < numbers.length - 1 && !duplicatesFound; i++)
16        {
17            for (j = i + 1; j < numbers.length && !duplicatesFound; j++)
18            {
19                if (numbers[i] == numbers[j])
20                    duplicatesFound = true;
21            }
22        }
23        if (!duplicatesFound)
24            results += "No duplicates were generated";
25        else
26            results += "First pair of duplicates were found at positions: \n"
27                    + i + " and " + j;
28        JOptionPane.showMessageDialog(null, results, "Output",
29                                    JOptionPane.INFORMATION_MESSAGE);
30        System.exit(0);
31    }
32 }
```

Figure 2

Q3 Bug Report (10 marks)

A system tester has filed the following bug report.

"I really DON'T KNOW what is going on here!!! I reported this bug last month. When I enter a 5-digit number, the number processed by the program seems to go negative on me."

Comment on this bug report paying particular attention to the elements of a bug report you would expect a professional system tester to produce.

End of Section A

Section B

Attempt 2 questions.

Q4 Bug Tracking and Bug Reporting (25 marks)

- (a) Differentiate between Bug Tracking and Bug Reporting. (5 marks)
- (b) Distinguish between Customer Problem Reports (CPRs) and Professional Bug Reports (PBRs) in the context of software testing. (10 marks)
- (c) Outline 5 uses of a Bug Report. (10 marks)

Q5 Software Inspections (25 marks)

- (a) List four differences between software inspection and software testing. (6 marks)
- (b) Distinguish between a walkthrough and an inspection paying particular attention to the purpose of each and the type of preparation involved. (9 marks)
- (c) What elements would you expect to find in the checklist for
 - i. a program inspection
 - ii. a requirements inspection? (10 marks)

Q6 System-level Testing (25 marks)

- (a) What is the aim of system-level testing? (3 marks)
- (b) Other than the functionality of the system, what else is system-level testing concerned with? (8 marks)
- (c) Explain each of the following terms:
 - i. Configuration testing
 - ii. Compatibility testing
 - iii. Usability testing (9 marks)
- (d) What is the purpose of a CRUD matrix in System-level testing? (5 marks)

Q7 Test Planning (25 marks)

- (a) What are the key elements of a Test Plan? (7 marks)
- (b) Distinguish between Stopping and Finishing in the context of test planning. (8 marks)
- (c) What does it mean to test according to the maturity of the software? (10 marks)