Two hours

UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE

Software Engineering Process frameworks

Tuesday 15th January 2008

Time: 14:00 – 16:00

Please answer the compulsory question in section A and ONE question in section B.

Use separate Answerbooks for EACH section

The use of electronic calculators is permitted provided they are not programmable and do not store text
Section A
You must answer this compulsory question.

1. a) What are the reasons for introducing **CASE** tools? Which are the related problems? (4 marks)

   b) What is **eXtreme Programming** (XP)? Which are its core features? When is it best to use XP? (5 marks)

   c) Consider the following **cost estimates** table for a number of system functions:

<table>
<thead>
<tr>
<th>System Function</th>
<th>Requirements</th>
<th>Design</th>
<th>Code</th>
<th>Test</th>
<th>Integrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept cash card</td>
<td>15</td>
<td>44</td>
<td>46</td>
<td>31</td>
<td>14</td>
</tr>
<tr>
<td>Check PIN</td>
<td>6</td>
<td>11</td>
<td>12</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Display balance</td>
<td>3</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Dispense cash</td>
<td>9</td>
<td>27</td>
<td>27</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Print receipt</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

Which of the system functions estimated cost of some development steps is disproportionately distributed as compared to the other system functions? What could be done about that? (4 marks)
d) Define McCabe’s Cyclomatic Complexity. When is it used? Examine the flow graph of a component of a purchasing system below. What is McCabe’s Cyclomatic Complexity for this? Discuss whether this component is a potential risk in terms of maintenance. (7 marks)
Section B
Answer only ONE of the following questions in this section.

2. a) Find below a code excerpt from the implementation of an imaginary algorithm. Construct a flow graph for this and calculate its McCabe’s Cyclomatic Complexity. Discuss whether this component is a potential risk in terms of maintenance.

```java
public void conc(int a, Object b, int c, int d, int e, int f)
{
    if(a <= c)
    {
        if (d == null)
        { d = new T(a,b); }
        else
        { d.imagine(a,b); }
    }
    else
    {
        if (e == null)
        { e = new T(a,b); }
        else
        {
            e.imagine(a,b);
            if (f == null)
            { e.j = 0; }
            else
            { e.j = 1; }
        }
    }
}
```

b) What are the main benefits and problems of using Commercial-Off-The-Shelf (COTS) systems? Discuss the key design decisions when using COTS.

(5 marks)

c) Discuss the advantages and disadvantages of various system changeover strategies. Which approach would you use if you were to replace a mission critical application and why?

(6 marks)
3. a) What are the advantages of reuse and reusable components? Which are the planning factors for reuse? (4 marks)

b) What are the methods for requirements prioritisation and their strengths and weaknesses? (4 marks)

c) The following matrix shows a system with 5 requirements compared pairwise. Use this matrix to calculate the relative importance for each requirement. Show all intermediate calculations in your answer. (8 marks)

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
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<td>5</td>
<td>7</td>
<td>9</td>
<td></td>
</tr>
<tr>
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<td>C</td>
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<td>0.142857</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0.333333</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
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</tbody>
</table>

d) What are the Chidamber & Kemerer (CK) metrics? Give two examples of how can these be used? (4 marks)