UNIVERSITY *of* LIMERICK

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COLLEGE *of* INFORMATICS *and* ELECTRONICS

Department of Computer Science
and Information Systems

End-of-Semester Assessment Paper

Academic Year:	2004/05	Semester:	2
Module Title:	Document Architectures	Module Code:	CS4146
Duration of Exam:	2½ Hours	Percent of Total Marks:	80
Lecturer(s):	Richard F. E. Sutcliffe	Paper marked out of :	100

Instructions to Candidates:

- Answer any FIVE questions
- Do not answer more than FIVE questions
- All questions carry equal marks

Q1. a) The Japanese writing system involves four different scripts: Kanji, Hiragana, Katakana and Roma-ji. Explain what these are and what purpose they serve in the language.

4 Marks

b) Consider the following 4 statements: (1) Shift-JIS (or SJIS) supports the characters in JIS X 0208-1997 but not those in JIS X 0212-1990. (2) It is a non-modal system comprising a mixture of one byte and two byte encodings. (3) ASCII characters are valid SJIS. (4) If a byte is in a certain range it is treated in isolation. If it is in a pair of ranges then it is treated as the start of a two byte sequence.

Carefully explain statements 1 to 3.

6 Marks

c)

Character Set	**1st Byte Range**	**2nd Byte Range**
ASCII/JIS-Roman	33-126	
½ width Katakana	161-223	
JIS X 0208-1997	129-159, 224-239	64-126, 128-252

By referring to the above table, explain precisely the meaning of statement 4 in part (b) above. **Note:** All numbers in the table are decimal (i.e. Base 10).

6 Marks

d) Name one advantage and one disadvantage of SJIS.

4 Marks

Q2. a) A Japanese Kanji or Chinese Hanzi is made up of one or more radicals each comprised of one or more strokes. Explain this statement using the following example:

Œ□ = ƒC + ‹□ = ƒm+□b+ ƒm+ □¥ + □¥ +□b

4 Marks

b) What is the stroke count of the Kanji shown above? Explain carefully.

4 Marks

c) Kanji or Hanzi are sometimes characterised as falling into four forms: Pictograph, Simple Ideograph, Compound Ideograph and Phonetic Ideograph. Explain what these terms mean.

4 Marks

d) The following list shows two pictographs, two simple ideographs, two compound ideographs and two phonetic ideographs. Explain which is which, giving a reason in each case.

□X forest
‰º down
—Ñ woods
“´ cave (dô)
ŽR mountain
–Ø tree
“º copper (dô)
□ã up

4 Marks

e) Two methods of entering Kanji or Hanzi are by stroke count and by pronunciation. Explain how these work.

4 Marks

Q3. a) What are Cascading Style Sheets (CSS) and in exactly what sense do they control the style of a document?

4 Marks

b)
```
01   H1 { font-size: 1.5em }
02   BODY  { background: url(parchment.jpg) red; color: green }
03   P EM  { background: yellow; color: black }
04   .note { margin-left: 5em; margin-right: 5em }
05   .firstwords { font-variant: small-caps }
06    A:link    { color: red }
07    A:visited { color: green; font-size: 60% }
```

In the above example what is the precise effect of line 2?

2 Marks

c) Which line in the above is a Contextual/Descendant Selector? Such selectors apply even if containment is not direct. Explain the effect of the selector including an XML fragment in your answer.

4 Marks

d) The rule on line 5 uses a Class Selector. What material in a document will match such a rule? How could a portion of text be demarcated in order for line 5 to apply to it?

4 Marks

e) Explain the effect of a Pseudo Element Selector. Which lines in the above example use such selectors and what is their effect?

4 Marks

f) Name one strength and one weakness of CSS.

2 Marks

Q4. a) What is the purpose of XPath in the XSL language?

4 Marks

b) An XPath expression consists of an Axis Specifier, a Node Test and zero or more Predicates. Explain briefly what these are.

3 Marks

c) How can the structure of a document be represented as a tree? Answer by drawing trees corresponding to the following descriptions:

- A manual consists of a version_spec, three chapters and an index.
- A manual consists of a version_spec, an introduction, two chapters and an index. Each chapter comprises an outline followed by two sections.

4 Marks

d) In the context of document trees, what is the difference between a relative path and an absolute path? Answer by showing any two absolute paths and any two relative paths using the second tree you have drawn.

4 Marks

e) Explain the meaning of the following XPath expressions:

```
child::chap

ancestor::title/child::level

doc//index

appendix/*/data

writer[@firstname="Ronan"]
```

5 Marks

Q5. a) What is the purpose of an XML Schema?

2 Marks

b)
```
01 <?xml version="1.0"?>
02 <xs:schema
03  xmlns:xs="http://www.w3.org/2001/XMLSchema"
04  targetNamespace="http://www.ul.ie"
05  xmlns="http://www.ul.ie"
06  elementFormDefault="qualified">
07  <xs:element name="note">
08   <xs:complexType>
09    <xs:sequence>
10     <xs:element name="to" type="xs:string"/>
11     <xs:element name="from" type="xs:string"/>
12     <xs:element name="heading"
13                 type="xs:string"/>
14     <xs:element name="body" type="xs:string"/>
15    </xs:sequence>
16   </xs:complexType>
17  </xs:element>
18 </xs:schema>

19  <?xml version="1.0"?>
20 <note
21  xmlns="http://www.ul.ie"
22  xmlns:xsi=
23  "http://www.w3.org/2001/XMLSchema-instance"
24  xsi:schemaLocation="http://www.ul.ie/note.xsd">
25
26 <to>Class</to>
27 <from>Lecturer</from>
28 <body>The next topic will be Schemas</body>
29 </note>
```

In the above, lines 1-18 show a schema while lines 19-29 show a sample document referring to it.

What does line 3 state and what is the exact significance of `xmlns:xs`?

4 Marks

c) Is there a processing instruction in lines 1-18 and if so what does it indicate?

2 Marks

d) An element called `note` is being defined. List the elements it is required to contain and for each state its required contents.

4 Marks

e) Look at the document in lines 19-29. Does it conform to the schema or not? Answer by going through lines 20-29 line by line explaining how it conforms to the schema. **Note**: You are not required to discuss any of the attributes or values of the element `note`.

8 Marks

Q6. a) What is meant by the term Document Type Definition (DTD)?

2 Marks

```
1.  <!-- Demonstration DTD  -->
2.
3.  <!doctype volume
4.  [
5.  <!ELEMENT volume o o (outline,sections,index,coda)>
6.  <!ELEMENT outline - - (#PCDATA)>
7.  <!ELEMENT sections - - (section+)>
8.  <!ELEMENT section - - (subsec*)>
9.  <!ELEMENT subsec - o (#PCDATA)>
10. <!ELEMENT index - - (inditem+)>
11. <!ELEMENT inditem - o (#PCDATA)>
12. <!ELEMENT coda - - (#PCDATA)>
13. <!ATTLIST section scope (all|some) all>
14. <!ATTLIST index date NUMBER #REQUIRED>
15. ] >
16. <!-- Instance of Volume -->
17. <volume>
18. <outline>
19. Outline Here
20. </outline>
21. <sections>
22. <section scope = none>
23. <subsec>
24. A subsection.
25. <subsec>
26. Another subsection.
27. </section>
28. </sections>
29. <index date = 1999>
30. <inditem>
31. First item
32. <inditem>
33. Second item
34. </index>
35. </volume>
```

b) The figure above shows an example Document Type Definition (DTD) followed by a document instance. Note that the numbers on the far left are to identify lines in this question and are not part of the document itself. What is the purpose of line 1?

2 Marks

c) Explain exactly what the ELEMENT definitions of lines 5, 6 and 8 mean.

6 Marks

d) Explain exactly what the ATTLIST definitions of lines 13 and 14 mean.

2 Marks

e) Look at the example document in lines 16 to 35. Does it conform to the DTD or not? Answer by going through the document explaining carefully how each tag, attribute or entity arises from the definitions in the DTD.

8 Marks

Q7. a)

```
01 <?xml version="1.0"?>
02 <xsl:stylesheet
03   version="1.0"
04   xmlns:xsl=
05   "http://www.w3.org/1999/XSL/Transform">
06
07 <xsl:template match="doc">
08  <HTML>
09   <HEAD>
10    <TITLE>Transformed Doc1</TITLE>
11   </HEAD>
12   <BODY>
13    <xsl:apply-templates/>
14   </BODY>
15  </HTML>
16 </xsl:template>
17
18 </xsl:stylesheet>
```

```
01 <?xml version='1.0'?>
02 <doc>
03 This is a document.
04 </doc>
```

XSLT is a language for transforming XML documents. A template rule in XSLT consists of a pattern together with a template. Above you will see an example stylesheet containing one template. Following this is an example document.

Identify the pattern and the template in terms of line numbers.

2 Marks

b) What is the role of the pattern in XSLT and what effect will the above pattern have exactly?

4 Marks

c) XSLT works by traversing a document tree. Draw a document tree for the example document above and explain what it means to traverse it.

4 Marks

d) What is the function of `apply-templates` and what will happen if this is left out?

4 Marks

e) A namespace is being used in the example template. Which is it and what is its function?

2 Marks

f) State what output will be produced when the above template is applied to the document and explain why this is the case.

4 Marks

Q8. a) In the context of XML what is a White Space character? Name the characters involved.

2 Marks

b) What is the purpose of Line End Normalisation?

2 Marks

c)
```
<sec>
   <auth>
     <first>John</first>
     <second>Ryan</second>
   </auth>
   </e-mail>john@xyz.com</e-mail>
...
```

The above fragment is formatted to enable its structure to be readily understood. However, is the formatting between <auth> and <first> a part of the document text or not? Write down a fragment of a Document Type Definition (DTD) which would show the XML parser that the space was not significant and explain carefully what it shows.

6 Marks

d) Now write another fragment which would show that the space *was* in fact significant. Explain your reasoning.

6 Marks

e) What is a Mixed Content Model? What restrictions are placed on such models within a DTD?

4 Marks