

**THE BCS PROFESSIONAL EXAMINATIONS**  
**Professional Graduate Diploma**

**April 2006**

**EXAMINERS' REPORT**

**The World Wide Web – Beyond the Basics**

**General**

This was the fourth time this subject has been examined. This subject area continues to grow in popularity, attracting an additional 22% of candidates this year compared to last. As in previous years, the general standard ranged from barely coherent to excellent; however, there appeared to be many more weaker submissions than in previous years.

Recurring issues from previous years:

1. Many candidates write far too much often taking two or more pages to make a simple point worth very few marks.
2. Handwriting continues to be an issue. There is ample time to write clearly and carefully whilst answering all questions in full.
3. The answers continue to be very heavy in textbook theory and not sufficiently contextualised. Answers must refer to real life issues, events and topics when asked.

A particular lacking was a general awareness of contemporary issues with respect to this subject – blogging in particular.

**Question 1**

1. a) With specific reference to websites:
  - i) What is meant by the term *benchmarking*? **(2 marks)**
  - ii) Explain what is meant by *acceptance testing*. **(3 marks)**
  - iii) Define the terms *load-testing* and *stress testing* when applied to a website. What, if any, are the differences between them? **(5 marks)**
  
- b) A website can be evaluated from three points of view: the *user*, the *owner*, and the *developer* of the site. For each of these stakeholders, list FOUR distinct characteristics that can be used as a measure of the success of a website. **(8 marks)**
  
- c) Given a business-to-consumer (B2C) website (e.g. <http://www.amazon.com>), and choosing ONE of the above stakeholders (user, owner, developer), devise a plan for testing the site. **(7 marks)**

**Answer Pointers**

- a)
  - i) Benchmarking is the act of running a set of standardised tests on an object to assess the relative performance or effectiveness. The answer should make reference to specific website metrics e.g. total page size, average number of links on page etc.
  - ii) User acceptance testing is the action of drawing up criteria to judge a website. The website is then assessed according to these criteria, which must be met for its formal acceptance by the client. Reference to metrics involving efficiency or performance are particularly relevant here.

- iii) Load testing is the action of testing a site by simulating typical user levels and tasks, and monitoring the response times and other similar metrics. Stress testing is similar to load testing, but evaluates the system's response at unusually high or peak loads. Usually, this involves loads that will put the system under extreme strain, and allow the developers to evaluate the way errors are handled due to this.

b) Some example characteristics include:

User	Ease of navigation	Usefulness of content.	Compatibility with user's browser and hardware.	Download time, Reliability, availability.
Owner	Number of visitors.	Revenue generated.	Number of links from other sites.	Customer feedback.
Developer	On time.	To budget.	Client satisfaction.	Number of elements that can be reused.

- c) This answer should draw up a coherent test plan for the target stakeholder. The test plan should involve well-formed and measurable criteria.

Regardless of the choice of stakeholder, a well formed test plan would be expected to put the following six characteristics into the context of web sites:

- Functionality
- Reliability
- Usability
- Efficiency
- Portability
- Maintainability

As a suggestion the plan might perhaps including the following (listed below for all three):

USER TESTS	OWNER TESTS	DEVELOPER TESTS
Navigation – no dead ends, etc	Accuracy	Reliability
Consistency – colour, font	Reliability	Load testing
Security of transactions	Availability	Backup
Reliability	Recover	Recovery
Interaction – error messages	Security of site	Security of site
Currency of content (age)	Scalability	Scalability

### Examiners' Comments

Part a) i): generally ok, but some candidates did not understand the term "benchmarking."

Part a) ii): many candidates failed to see acceptance terms in context i.e. from the point of view of the owner - a lot of candidates took a user view.

Part a) iii): some very good answers but generally lack of distinction between load and stress testing and often responses focused on correct loading of a web page for a single user.

Part b) Some very good answers but a small number focused on how a site should be built rather than on what measures could be used to judge the success of a site.

Part c) Some good answers but a lot of candidates mixed up the plans for all three groups and presented it as one. Lack of structured response.

## Question 2

2. a) Expand and define the following terms:

- i) XML (1 mark)
- ii) SSL (1 mark)
- iii) HTTP (1 mark)
- iv) CSS (1 mark)
- v) RSS (1 mark)

- b)
- i) Define the term *blogging*. (2 marks)
  - ii) State THREE possible uses for a blog. (3 marks)
  - iii) Describe how a blog differs from a traditional website. (5 marks)

- c) Explain, with the use of appropriate realistic examples, FOUR risks inherent in relying on information acquired from WWW sites, and a way to mitigate each of these risks. (10 marks)

## Answer Pointers

a)

- i) Extensible Markup Language – a general markup language used to create special-purpose markup languages.
- ii) Secure Sockets Layer – a suite of standard cryptographic protocols which provide for secure communications on the Internet
- iii) Hypertext Transfer Protocol – the protocol used to transport files (most specifically web pages and files) over the WWW.
- iv) Cascading Style Sheets - a stylesheet language used to describe the presentation of a markup document.
- v) Really Simple Syndication (or equally, Rich Site Summary or RDF Site Summary) - a family of XML file formats for Web syndication.

b)

- i) A weblog or blog is a online journal – a web-based publication consisting primarily of periodic articles.
- ii) Photo album, Diary, Record keeping, Community forum, Live newsfeed (amongst others).
- iii) In contrast to a normal web site, blogs often:
  - Are constructed using a content management system, which allows non-programmers to have a sophisticated, easily updated web site with no HTML skills.
  - Follow common templates (so blog owners do not have to have design skills), into which content is fed.
  - Allow the owner to add other authors, and easily manage permissions and access.
  - Allow for adjusting the visibility of an article (public, private, friends only, etc.).
  - Facilitate adding new pages through a webpage-based interface.
  - Support other users commenting on articles, which can lead to discussion
  - Allow easy filtering of content e.g. by date, category, author, etc.

c) Risks include:

Risk	Example
Doubts on accuracy of information	e.g. inaccurate sites on medical diagnostics
Doubts on currency of information	Sites not updated without a visible indication of its age.
Lack of authority and peer review	Certain Wikipedia pages
Lack of accountability	Certain Wikipedia pages
Ease of libel	E.g. Barrett vs Owen, 2001
Potential impersonation of other people/sites – website imitation	“Phishing” sites pretending to be e.g. eBay.
Potential bias or conflict of interests	Review of software by publisher from opposing camp

Ways to mitigate these risks include cross checking with other web sites, cross checking with peer reviewed or published works, authenticating sources and websites, looking for assurances of quality (e.g. sites owned and edited by well-respected experts).

### Examiners' Comments

Part a): Generally ok, except very few candidates knew what was meant by RSS. Additionally, some candidates did not explain what the terms actually referred to, or did not understand the terms, and attempted to work around this by writing large amounts of irrelevant information.

Part b): Generally omitted, and of those that did attempt it, very few had an understanding of what blogging is. Some believed it was connected with website security.

Part c): Many candidates did not read the question thoroughly, and instead discussed general security concerns of the WWW, which are of little relevance to the question. No real life examples given in most answers.

### Question 3

a) Explain, with the aid of diagrams, what is meant by the following website navigation schemes:

- i) Linear
- ii) Hierarchical
- iii) Matrix

(6 marks)

b) **Figure 1** describes the navigation structure of a static website selling Digital Cameras.

- i) List, with a justification, FIVE weaknesses of this website structure. (9 marks)
- ii) Redesign the navigation of this website using a more efficient scheme, and represent this scheme by redrawing the navigation diagram, explaining BRIEFLY the key changes that have been made.

(10 marks)

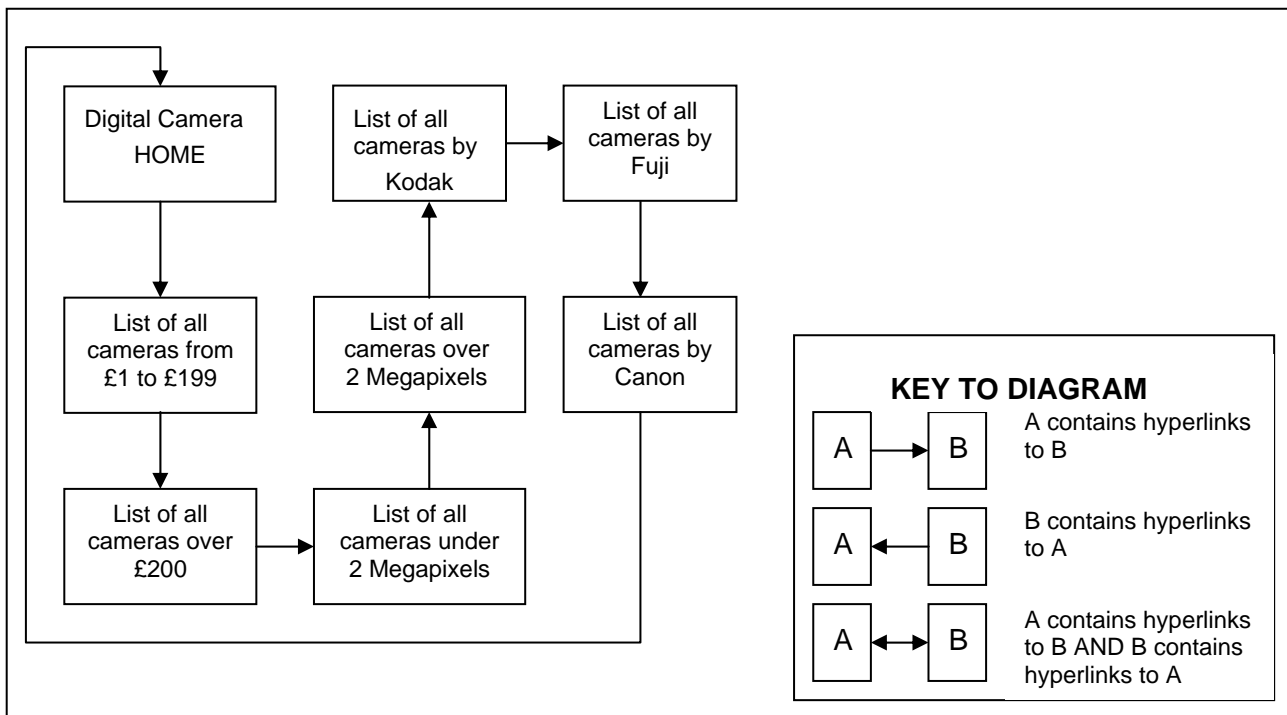
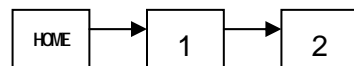


Figure 1. Website navigation diagram

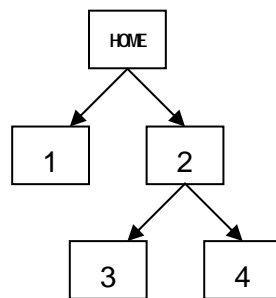
**Answer Pointers**

a) Explain, with a diagram, what is meant by the following website navigation schemes:

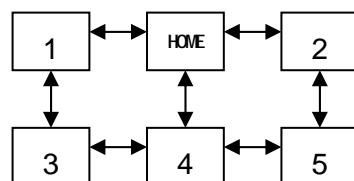
i)



ii)



iii)



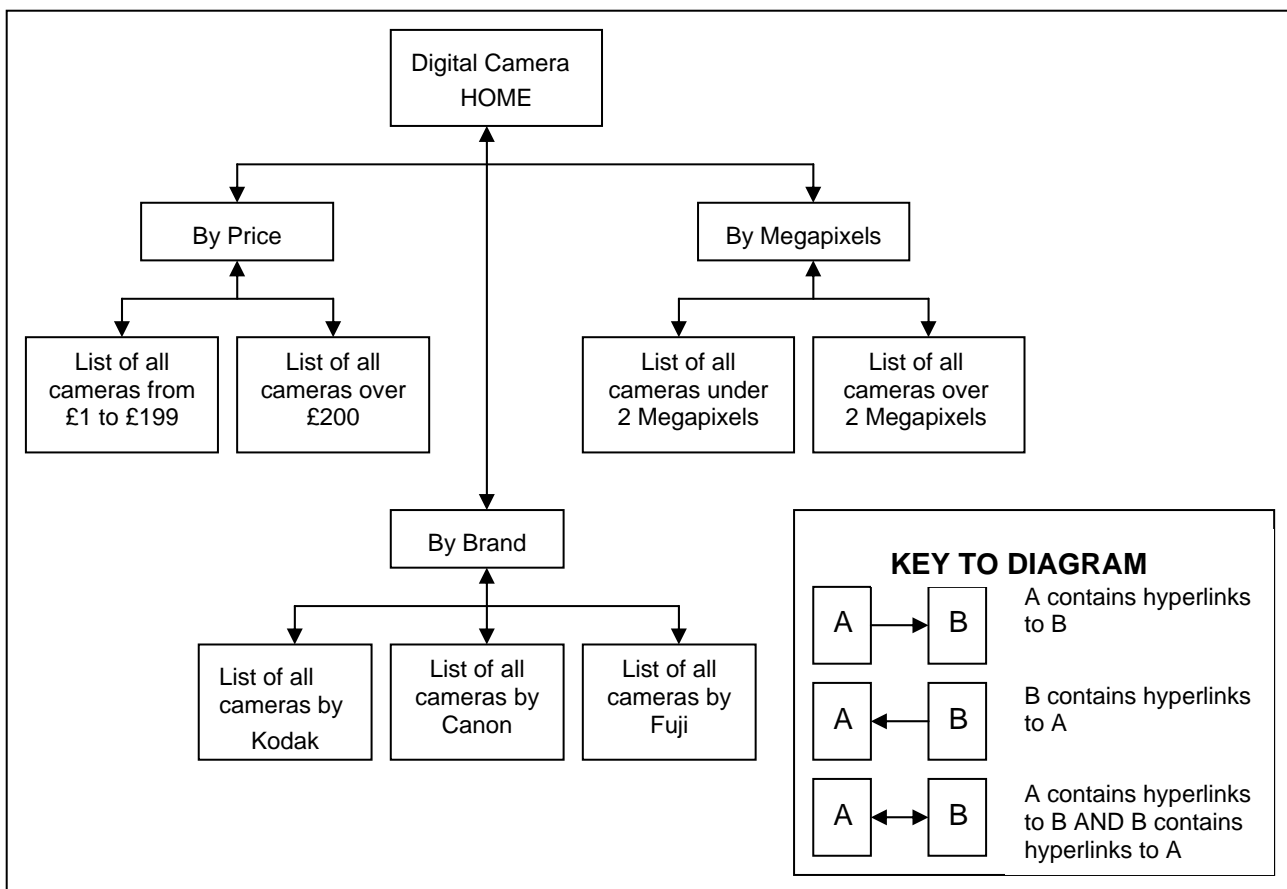
b)

i)

- Linear – forces user to navigate through unnecessary pages.
- Links are all one direction.

- Information is potentially replicated on different pages.
- Site structure does not reflect the *logical* structure of three different categories of classifying cameras as detailed (by price, by megapixels, by manufacture).
- No links at a layer level (e.g. a Kodak camera with 2 megapixels that is £200 should be linked to by three pages in this structure), nor direct links from e.g. one manufacturer to another.
- Inflexible and inextensible: It would be difficult to add additional categories without reengineering the site structure.

ii) As an example:



The answer should also indicate textually the changes made from the original figure .

### Examiners' Comments

Approximately half the candidates attempted this question and the answers were generally good.

Part a): generally perfect descriptions, but usually no real life examples given.

Part b) i): Generally a few weaknesses pointed out, but often weak justifications. Occasionally candidates would criticise the site for being “static” and not “dynamic”, but this is impossible to tell from the navigation diagram alone.

Part b) ii): The diagram and revised navigation were usually good, but generally very weak description of changes made. Some candidates designed and drew web pages, which was not the question asked.

#### Question 4

4. a) Credit card numbers may be viewed as an example of *sensitive data*.  
i) Give FOUR *other* examples of sensitive data. **(4 marks)**  
ii) Why should sensitive data be encrypted before transmission over the Web? **(3 marks)**
- b) Considering the three elements (client, network, server) involved in a web transaction over a conventional wired network, detail FIVE security risks to confidential data and, for each risk identified, list potential consequences of a breach of security. **(10 marks)**
- c) The widespread use of public terminals (e.g. in airports, libraries, cyber cafés) introduces additional risks to the privacy of a user. With reference to realistic examples, outline FOUR of these risks and describe how a user can mitigate against them. **(8 marks)**

#### Answer Pointers

- a)
- i)
- Personal data e.g. Social security number, date of birth
  - Financial data e.g. bank accounts, credit card numbers
  - Private data e.g. passwords
  - Confidential data e.g. exam papers
- ii) To ensure the following:
- Integrity
  - Confidentiality
  - Privacy
- b) There are many different risks:
- Client-end:
- Hardware Keylogging
  - Trojaned software
  - Forged Emails e.g. as recently pretending to be from Barclays or Microsoft  
(For all three, the consequence is disclosure of confidential data such as passwords)
- Network:
- Sniffing (Consequence is disclosure of confidential data in transit)
  - Retransmission (Consequence is authorising a transaction multiple times)
  - Spoofing/Masquerading (Consequence is sending data to an unauthorised person)
  - Man-in-the-middle – as above
- Server-end:
- Server compromise (leading to database disclosure) (Consequence is full access to confidential data on server)
  - Trojan (Consequence is disclosure of confidential data such as passwords)
- c)
- Web browsers offering to remember passwords – disable autocomplete etc.
  - Windows saving passwords in a password list – do not ask Windows to save passwords
  - Potential for installed keyloggers/trojan horse programs - Check for spy programs
  - Subsequent user browsing through your history and cookies – Clear the cache

## Examiners' Comments

This was a very popular question, attempted by nearly every candidate.

Part a) i): Generally well done.

Part a) ii): Many responses focused on how to encrypt data rather than why.

Part b): Very few clearly identified the three elements and the related risks to each. Some risks were repeatedly stated with very little of the consequences of a breach in security. Some clearly did not understand the term "client" in a network context, and instead interpreted it as a commercial entity.

Part c): Some good answers but a lot went on to discuss airport security, library security with little on how to mitigate against the risks. Common response was "do not use the internet" – this is not a mitigation.

## Question 5

Static web pages can be made dynamic by the use of scripts that manipulate the Document Object Model (DOM).

- a) Scripts can be executed at the server end or at the client end for a Web application. When would it be appropriate to execute at:
- i) the server end;
  - ii) the client end?
- (Illustrate your answers with suitable realistic examples.) **(5 marks)**
- b) Explain, with the use of a diagram, the key elements of the DOM. **(5 marks)**
- c) **Figure 2 (at the end of this question paper)** details the source code of a web site for a restaurant.
- i) Draw a diagram to complete the missing sections A, B and C indicated in **Figure 3** below to illustrate the output of this file when it is first loaded in a browser window. State the browser you are assuming use of. **(3 marks)**
  - ii) The links have JavaScript actions attached to them. Describe what will happen on screen in relation to user interaction with the links. **(4 marks)**
  - iii) The restaurant wishes to add extra details to the web page, with the same format and functionality as the current content. Write code to enable the menu group displayed in **Figure 4** (below) to be generated and displayed. **(4 marks)**
  - iv) Using CSS, list modifications to the code to change the appearance of the listed groups to the following:  
**Starters:** Italic text, surrounded by a dotted 1 pixel border **(2 marks)**  
**Main course:** Bold text, surrounded by a solid 2 pixel border **(2 marks)**  
(**Note:** Your answer should list only the changes and additional lines required.)



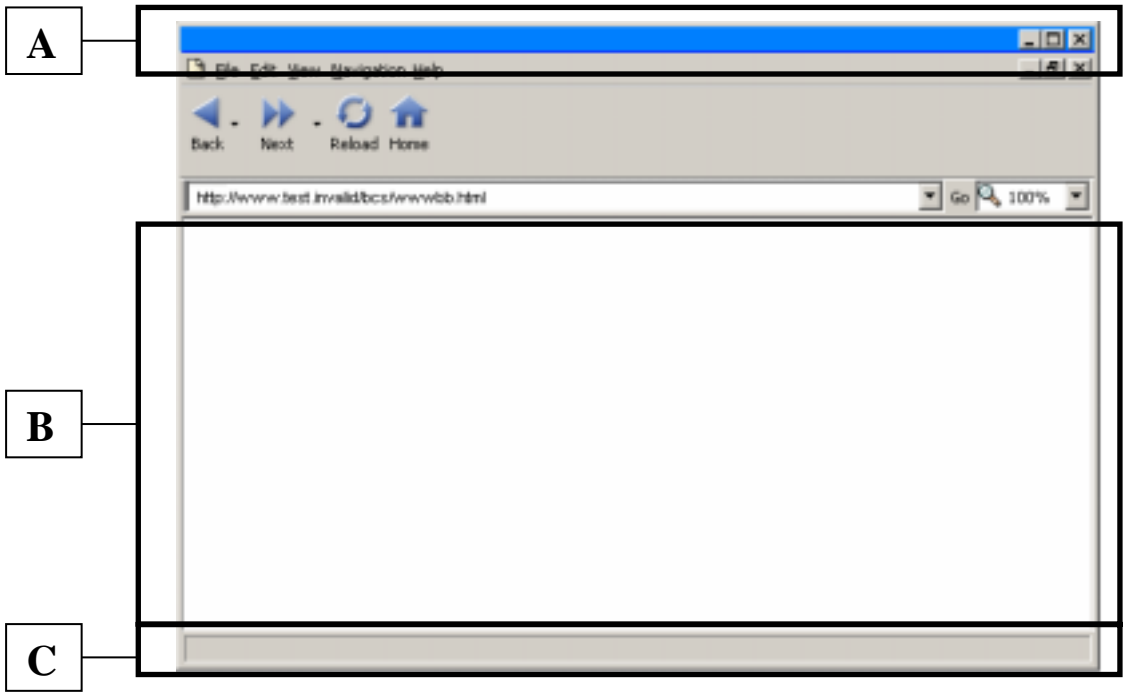


Figure 3: Template browser page

## Desserts

Apple Pie  
Kulfi  
Cheesecake

Figure 4: Menu group to add

```
1: <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
2:   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
3: <html>
4:   <head>
5:     <meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
6:     <title>Le Menu</title>
7:     <script type="text/javascript" language="javascript">
8:     <!--
9:     function togglegroup(currgroup){
10:        if(document.all){
11:            thisgroup = eval("document.all."+currgroup+".style");
12:
13:            if(thisgroup.display == "block"){
14:                thisgroup.display = "none";
15:            }
16:            else {
17:                thisgroup.display = "block";
18:            }
19:
20:            return false;
21:        }
22:        else {
23:            return true;
24:        }
25:    }
26:    -->
27:   </script>
28:   <style type="text/css">
29:     .group { display:none; margin-left:20px;}
30:   </style>
31: </head>
32: <body bgcolor="white">
33:   <h1>Restaurant group</h1>
34:   <h3><a href="page1.html" onmouseover="return togglegroup('group1')">
35:     Starters</a></h3>
36:   <p id="group1" class="group">
37:     Fruit Salad<br />
38:     Soup de jour<br />
39:     Prawn Cocktail
40:   </p>
41:   <h3><a href="page2.html" onmouseover="return togglegroup('group2')">
42:     Main Courses</a></h3>
43:   <p id="group2" class="group">
44:     Risotto<br />
45:     Chicken Teriyaki<br />
46:     Steak Pie
47:   </p>
48:   <p>
49:     <a href="http://validator.w3.org/check?uri=referer"></a>
52:   </p>
53: </body>
54: </html>
```

Figure 2: Source code listing

## Answer Pointers

a)

i)

- Serving customised content based on information you know about the user.
- Need to include output from a legacy application or database transaction or search processing

ii)

- Interaction with user's environment
- Need to change the appearance of the web page as the user interacts with it.
- Prevent round-trips to the server by validating form input before submitting.

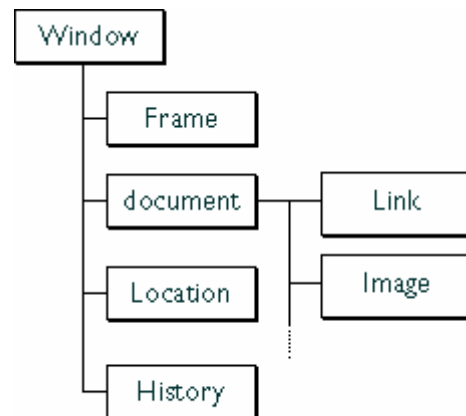
The answer should put these into context e.g. a travel website validating dates (on both client side and server side).

b)

The essential components are:

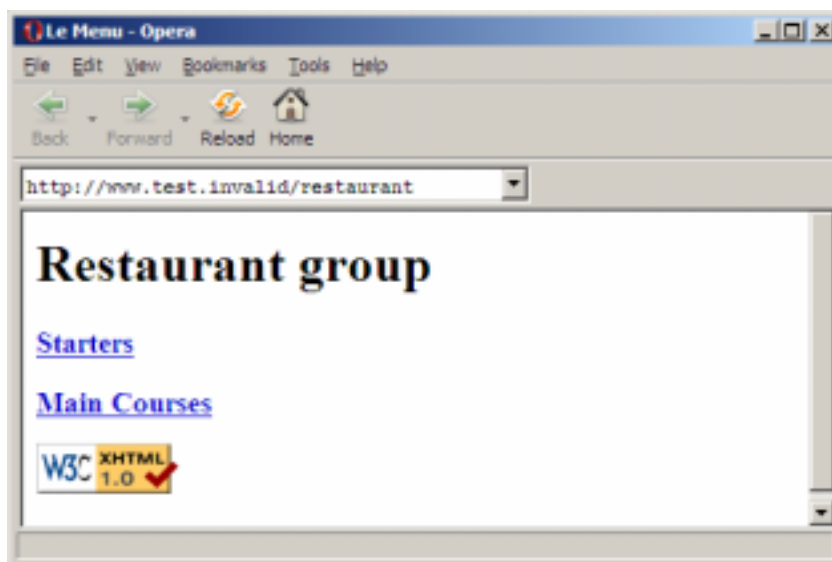
- window
- document
- frames
- location
- history

Other DOM elements (e.g. link, image etc.) should be taken into account, but are worth less credit.



c)

i)



ii)

When the mouse rolls over a link, the related menu group is displayed. If the mouse rolls over a second time, the menu is made invisible.

The menu groups are displayed and made invisible independently of each other.

iii) Add the following code after line 47:

```
<h3><a href="page3.html" onmouseover="return togglegroup('group3')">
  Desserts</a></h3>
<p id="group3" class="group">
  Apple Pie<br />
  Kulfi<br />
  Cheesecake
</p>
```

iv) Add the following code after line 29:

```
.starter { border: 1px dotted black; font-style: italic;}
.main { border: 1px solid black; font-weight: bold;}
```

Amend line 36:

```
<p id="group1" class="group starter">
```

Amend line 43:

```
<p id="group2" class="group main">
```

### Examiners' Comments

Part a): Generally well answered, although candidates did not illustrate the answers with real-life examples as requested.

Part b) generally not understood, and the main elements of the DOM not recalled. Some confused with similar question from previous year, and attempted to list the DOM of the given image.

Part c) i): generally very good

Part c) ii): often was "on click", occasionally assumed the same functionality as previous years - it wasn't!

Part c) iii): generally well answered.

Part c) iv): Very few candidates attempted this question, and those that did often used <b> and <i> tags – the question must use CSS. Additionally, the new CSS class must be added to the menu **as well as** the old one.