BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 6 Professional Graduate Diploma in IT

WEB ENGINEERING

Tuesday 24th March 2020 – Afternoon

Answer **any** THREE questions out of FIVE. All questions carry equal marks.

Time: THREE hours.

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Calculators are **NOT** allowed in this examination.

Section A
Answer Section A questions in Answer Book A

A1.

a) Compare the following terms:

i) HTTP and HTTPS;
ii) Asymmetric and Symmetric encryption;
iii) HTML and XHTML;
iv) RSS and IRC;
v) DES and AES.

(15 marks)

b) Write the CSS code to style the web page indicated in Figure A1.1. You can use the variables values shown in the figures A1.1 and A1.2 to create and style the divisions of the web page.

(10 marks)

A2.

a) Explain, with an example for each, what is meant by the following terms:

i) Phishing;
ii) RESTful;
iii) WSDL;
iv) Web profiling;
v) E-commerce.

(15 marks)

b)

i) Describe the main components of client/server architecture, with a figure depicting how these components interact with each other.

ii) How different is P2P compared to client/server architecture?

(10 marks)

[Turn Over]

Section B
Answer Section B questions in Answer Book B

B3.

a) Data can be stored in child elements or in attributes as demonstrated by the example in Figure B3.1. Briefly state **FIVE** factors to be considered when using attributes instead of child elements**.**

(5 marks)

b) The XML document in Figure B3.2 contains a number of errors when validated. Identify all the errors and provide a correction for each.
[Note: the line numbers are for your benefit and are not part of the XML code.]

(5 marks)

c) An XML schema can be written as a DTD or as XSD (xml schema document). State the benefits and drawbacks of each approach. Convert the DTD in Figure B3.2 to an XML schema.

(5 marks)

d) Write an external DTD for the XML file in Figure B3.3:

i) The element `trainlog` may contain, in any order, one or more `session` and `progress_report` elements;
ii) A `session` element must first contain a `duration` element, followed by `distance` element, followed by a `location` element, followed optionally by a `comment` element, followed by zero or more `photo` elements;
iii) The `date` and `heartrate` attributes in `session` are optional;
iv) The `type` attribute in `session` must be present but allow only 3 values – running, swimming, cycling - with default set to running;
v) A `photo` element must contain a `url` attribute but may not contain any text;
vi) A `progress_report` element must contain one or more `comment` elements.

(10 marks)

[Turn Over]

B4.

a) The editor of a popular online business magazine has decided to include a section on businesses for sale. This will be a free service. Registered and verified sales agents can submit details of a business for sale as an XML document which will then be rendered as an HTML page to be hosted on the magazine's web site. The editor has checked that there are no legal issues in doing this. A sample of the XML document is shown in figure B4.1 and this document rendered as a web page is shown in figure B4.2.

The businesses are separated into freehold and leasehold with details of:

i) location,
ii) type of business,
iii) financial information,
iv) business image,
v) sales agent,
vi) local authority, and
vii) a brief description.

The image is to also serve as a link to a photo gallery for the business. The agent name is a link to the agent's web site and the email address is to be an active link. The style sheet to be used is already in place and is available for use with name

`business.css .`

You are to write the code that will process the XML data and render it as a web page as shown in Figure B4.2. You are advised to show the code for the following, including appropriate comments to explain how the code will work:

i) The HTML template in which the XSL code will be embedded;
ii) The code to display all businesses by type;
iii) The code to display business image;
iv) The code to make the displayed image into a link that will open another window where a photo gallery of the business will be displayed;
v) The code to display all the agent details as shown including the agent name and the email address rendered as links.

(20 marks)

b) A further enhancement that the editor would like to provide is a feature for a potential investor to make an appointment with the agent to view the business and the financial accounts. Discuss how this could be achieved; note that you are not required to code this.

(5 marks)

[Turn Over]

B5.

a) Describe and differentiate between a software library and a framework citing suitable examples of **EACH** type.

(2 marks)

b) A software system can be built using a framework. Briefly explain the benefits and drawbacks of using a framework.

(5 marks)

c) Define the acronym MVC and briefly explain what each part is in relation to developing an application.

(3 marks)

d) Identify the optimal conditions for an MVC approach to be beneficial when designing an application.

(5 marks)

e) As a Web Engineer, identify at least **FIVE** major challenges in the design and development of an image-hosting site, where users can upload their images to a central server and the images can be retrieved via a web link or an API.

Initially, focus on two of the core services - the ability to upload (write) an image to the server, and the ability to query for an image. For **EACH** of the challenges identified, provide an outline solution including the technology to be used.

Your answer should be in the form of a slide presentation to the client (**FIVE** slides with bullet points). No marks will be given for answers that quote stages of SDLC (Software development life cycle).

(10 marks)

END OF EXAMINATION

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FIGURES TO ACCOMPANY MARCH 2020 EXAMINATION PAPER IN WEB ENGINEERING

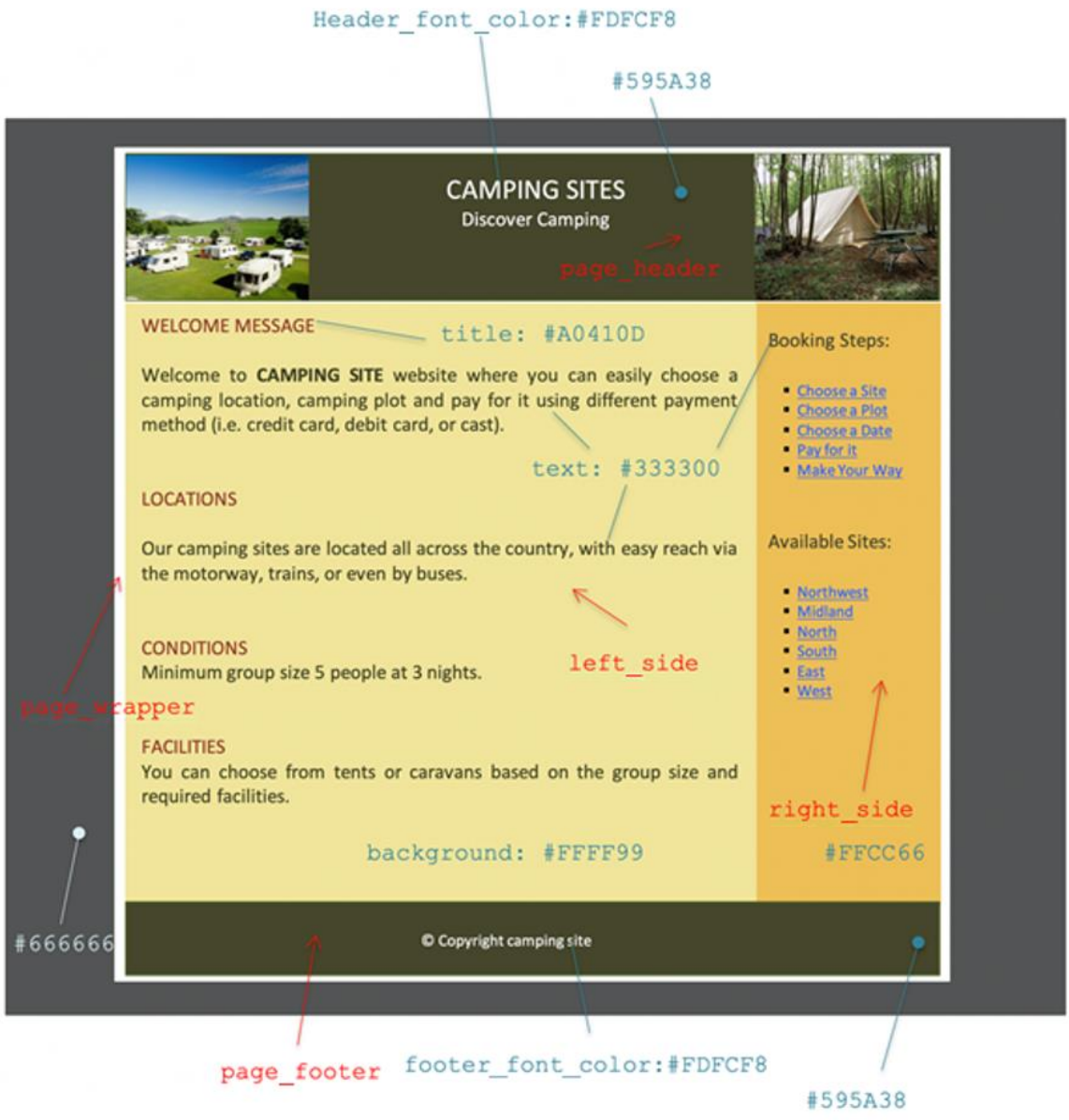

Figure A1.1

640px
30px
30px
CAMPING SITES
Discover Camping
140px
WELCOME MESSAGE
Welcome to CAMPING SITE website where you can easily choose a camping location, camping plot and pay for it using different payment method (i.e. credit card, debit card, or cast).
4px
10px
LOCATIONS
Our camping sites are located all across the country, with easy reach via the motorway, trains, or even by buses.
CONDITIONS
Minimum group size 5 people at 3 nights.
FACILITIES
You can choose from tents or caravans based on the group size and required facilities.
Booking Steps:
Choose a Site
Choose a Plot
Choose a Date
Pay for it
Make Your Way
Available Sites:
Northwest
Midland
North
South
East
West
160px
© Copyright camping site
70px
30px

Figure A1.2

option 1:

```
<booking reference="20120521" date="12/05/2012">
     <agent>M.Miles</agent>
     <client_name>Jane Doe</client_name>
     <client_email>jdoe@jmail.com</client_email>
     <advice>No changes allowed</advice>
</booking>
```

option 2:

```
<booking reference="20120521">
     <date>12/05/2012</date>
     <agent>M.Miles</agent>
     <client_name>Jane Doe</client_name>
     <client_email>jdoe@jmail.com</client_email>
     <advice>No changes allowed</advice>
</booking>
```

option3:

```
<booking reference="20120521">
     <date>
       <day>12</day>
       <month>05</month>
       <year>2012</year>
     </date>
     <agent>M.Miles</agent>
     <client_name>
       <first_name>Jane</first_name>
       <last_name>Doe</last_name>
     </client_name>
     <client_email>jdoe@jmail.com</client_email>
     <advice>No changes allowed</advice>
</booking>
```

Figure B3.1

```
0     <?xml version = "1.0" encoding="UTF-8"?>
1     <!DOCTYPE cv [
2     <!ELEMENT cv (preface, (qualification | experience)+, hobbies?, referee*)>
3     <!ELEMENT preface (#PCDATA)>
4     <!ELEMENT qualification (#PCDATA)>
5     <!ELEMENT experience (#PCDATA)>
6     <!ELEMENT hobbies (#PCDATA)>
7     <!ELEMENT referee (#PCDATA)>
8     <!ELEMENT companyAddress (#PCDATA)>
10 ]>
11    <cv>
12    <preface> First Name: Alex</preface>
13    <preface> Last Name: Elder</preface>
14    <Qualification>BSc</Qualification>
15    <experience>Charity work</experience>
16    <qualification>MSc</qualification>
17    <experience>Charity work</experience>
18    <qualification>MSc</qualification>
19    <hobbies> swimming</hobbies>
20    <referees> Gita Patel, BSc</referees>
21    <hobbies> running<hobbies>
22    <!--<hobbies> kite flying <hobbies>-->
23 </cv>
```

Figure B3.2

```
<?xml version="1.0" encoding="UTF-8"?>

<trainlog>

  <progress_report>
    <comment>
      Performance improved significantly</comment>
  </progress_report>
  <session date="11/01/19" type="running" heartrate="158">
    <duration units="minutes">50</duration>
    <distance units="miles">5.5</distance>
    <location>Hyde Park</location>
    <comment>Mid-morning run, a little winded throughout.</comment>
    <photo url="http://bbc.co.uk/cloud.jpg"/>
    <photo url="http://bbc.co.uk/london.jpg"/>
  </session>

  <session date="16/01/19" type="cycling" heartrate="153">
    <duration units="hours">1.5</duration>
    <distance units="miles">26.4</distance>
    <location>Crystal Palace</location>
    <comment>Hilly ride, felt strong as an ox.</comment>
  </session>

  <session date="23/01/19" type="running" heartrate="156">
    <duration units="hours">2.5</duration>
    <distance units="miles">16.8</distance>
    <location>Regents Park</location>
    <comment>Afternoon run, felt reasonably strong.</comment>
  </session>
  <progress_report>
    <comment>
      Performance did not change</comment>
  </progress_report>

</trainlog>
```

Figure B3.3

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="items.xsl" ?>
<List>
  <category>
    <type>Freehold </type>
    <business id="H1234" year_opened="1990">
      <trade>Fish and Chip Shop</trade>
      <location>Haven Green</location>
      <image src="h1.png" height="100" width="100"/>
      <business_gallery page="H1234.xml"/>
      <price>550000</price>
      <Annual_TO>230000</Annual_TO>
      <agent>
        <name>
          Business Finders</name>
        <email>sales@busfinders.com</email>
        <phone>032034590</phone>
        <address>12 London Road Ealing W5 5RD</address>
        <agent_url page="http://www.busfinders.com"/>
      </agent>
      <local_authority>Ealing</local_authority>
      <description>The fish and chip shop occupies a single storey detached property in
a prominent
        trading position in a sought after location.</description>
    </business>

    <business id="H2345" year_opened="2005">
      <trade>Takeaway Curry Shop</trade>
      <location>Greenford</location>
      <image src="h2.png" height="100" width="100"/>
      <business_gallery page="H2345.html"/>
      <price>110000</price>
      <Annual_TO>125000</Annual_TO>
      <agent>
        <name>
          Ealing Estates</name>
        <email>sales@ealingestates.co.uk</email>
        <phone>02088791234</phone>
        <address>55 The Broadway W7 6WX</address>
        <agent_url page="http://www.ealingestates.co.uk"/>
      </agent>
      <local_authority>Hillingdon</local_authority>
      <description>Ideally located at the end of a small parade,
        surrounded by a large residential area.</description>
    </business>
  </category>
  <category>
    <type>Leasehold</type>
      <business id="F1255" year_opened="2000">
        <trade>
          Dry Cleaning Business
        </trade>
        <location>Perivale</location>
        <image src="h3.png" height="100" width="100"/>
        <property_gallery page="F1255.html"/>
        <price>130000</price>
        <Annual_TO>150000</Annual_TO>
        <agent>
          <name>
            Ealing Estates</name>
          <email>sales@ealingestates.co.uk</email>
          <phone>02088791234</phone>
          <address>55 The Broadway W7 6WX</address>
          <agent_url page="http://www.ealingestatets.co.uk"/>
        </agent>
        <local_authority>Brent</local_authority>
        <description>A busy commercial laundry, servicing the West London,
          with over 130 loyal customers and potential for expansion.</description>
      </business>

    </category>

  </List>
```

Figure B4.1

Business for sale 2019

Freehold							
Reference	**Location**	**Business**	**Price and Annual Turnover**	**Image**	**Agent**	**Local Authority**	**Description**
H1234	Haven Green	Fish and Chip Shop	Price is £550000 Turnover is £230000		Business Finders Address:12 London Road Ealing W5 5RD email:sales@busfinders.com Phone: 032034590	Ealing	Year opened:1990 The fish and chip shop occupies a single storey detached property in a prominent trading position in a sought after location.
H2345	Greenford	Takeaway Curry Shop	Price is £110000 Turnover is £125000		Ealing Estates Address:55 The Broadway W7 6WX email:sales@ealingestates.co.uk Phone: 02088791234	Hillingdon	Year opened:2005 Ideally located at the end of a small parade, surrounded by a large residential area.
Leasehold							
Reference	**Location**	**Business**	**Price and Annual Turnover**	**Image**	**Agent**	**Local Authority**	**Description**
F1255	Perivale	Dry Cleaning Business	Price is £130000 Turnover is £150000		Ealing Estates Address:55 The Broadway W7 6WX email:sales@ealingestates.co.uk Phone: 02088791234	Brent	Year opened:2000 A busy commercial laundry, servicing the West London, with over 130 loyal customers and potential for expansion.

Figure B4.2