BCS THE CHARTERED INSTITUTE FOR IT

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

WEB ENGINEERING

Tuesday 17th November 2020 - Afternoon

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

Time: THREE hours.

Answer any <u>Section A</u> questions you attempt in <u>Answer Book A</u>
Answer any <u>Section B</u> questions you attempt in <u>Answer Book B</u>

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) Explain how **http** and **https** differ in the ways in which they work and assess the security offered by **EACH**.

(5 marks)

b) Evaluate **THREE** security advantages and **TWO** risks associated with the https protocol.

(5 Marks)

c) What is meant by **single-factor authentication** (SFA) and **two-factor authentication** (2FA)? Give an example of the typical use of **EACH**.

(5 Marks)

d) What are the advantages of 2FA over SFA?

Evaluate **THREE** ways of implementing 2FA, demonstrating how security is enhanced and risks mitigated.

(10 Marks)

A2.

a) Compare and contrast **FTP**, **BitTorrent** and **peer-to-peer** network technologies. In your answer you **SHOULD** include an assessment of:

   i) How each of the mechanisms work;
   ii) The architectural issues associated with each;
   iii) An evaluation of the principal advantages and disadvantages of each, with reference to security, robustness and reliability.

Include an annotated diagram to illustrate the workings of **EACH**.

(15 marks)

b) Explain the use of the **.htaccess** and **.htpasswd** files to control access to web pages.

(3 marks)

c) What is the **REST** architectural model? Explain the **MAIN** principles by which it is applied to web services.

(7 marks)

B3.

a) Assess **FOUR** main advantages OR disadvantages of file-based and database-based data storage for **XML web applications**. Explain when it is advantageous to use each.

(8 marks)

b) Evaluate an architecture that is designed to protect a database server connected to a web application from external attack. Evaluate the effectiveness in doing this.

(7 marks)

c) Describe the principles of a **SQL Injection attack**. What data could be accessed by means of such an attack and how might this be prevented? Provide an example of how such an attack can be prevented, with example code.

(10 marks)

[Turn Over]

B4.

a) Describe what is meant by a **Document Type Definition** (DTD) and how it is used.
(4 marks)

b) Explain why an application would use a DTD when the XML document follows the same structure.

(3 marks)

c) Consider the XML file in figure 5.1 below.

```xml
<?xml version="1.0" encoding="ISO-8859-1" standalone="no"?>
<!DOCTYPE EmployerList SYSTEM "employer.dtd">
<?xml-stylesheet type="text/xsl" href="employer.xsl"?>

<EmployerList>
      <Employer CODE="1001">
      <Employer_name>ACME Engineering</Employer_name>
      <Employer_url page="http://www.acme.co.uk"/>
      <Job_vacancy>
            <Job_title>Office Manager</Job_title>
            <Job_description>Managing an office of 25
      staff</Job_description>
            <Job_location>
                  <city>
                        Sheffield
                  </city>
            </Job_location>
            <Contact>
                  <Contact_name>
                        <title> Mr </title>
                        <first_name> Fred </first_name>
                        <last_name> Bassett </last_name>
                  </Contact_name>
                  <Contact_phone>+441234667788</Contact_phone>
                  <Contact_email>f.bassett@acme.co.uk</Contact_email>
            </Contact>
            <Job_salary>£40000</Job_salary>
            <Start_date>1 August 2020</Start_date>
      </Job_vacancy>
      <Job_vacancy>
            <Job_title>Driver</Job_title>
            <Job_description>
                  Day journeys over much of the north of England
            </Job_description>
            <Job_location>
                  <district>
                        Peak District
                  </district>
            </Job_location>
            <Contact>
                  <Contact_name>
                        <title> Ms </title>
                        <last_name> Evans </last_name>
                  </Contact_name>
                  <Contact_phone>+441298777555</Contact_phone>
            </Contact>
            <Job_salary>£20000</Job_salary>
      </Job_vacancy>
      </Employer>
</EmployerList>
```

Figure 5.1

Construct a DTD which includes the same rules as shown in this example. It should also be noted that the employer code must be present only once, for **EACH** employer. **(12 marks)**

d) It has been decided to add an identifier to each job vacancy of the form that identifies whether the job is full or part time (identified by either Full or Part – these are the only possible values). This field **MUST** appear at least once, and if not specified shall have the value Full. Show how your answer would need to be modified to incorporate this, with a full explanation of how it functions.

(6 marks)

B5.

a) What is meant by the following acronyms?

   i) DOM;
   ii) CGI;
   iii) XSLT.

Explain with examples when you would use **EACH**.

(12 marks)

b) What are **blogs**, **WIKIS** and **RSS**? Evaluate how they differ in the way in which they are used and assess the differences that make each appropriate for particular uses, with examples.

Evaluate how they differ from traditional web applications.

(13 marks)

End of Examination