BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

PRINCIPLES OF INTERNET TECHNOLOGIES

Friday 20th March 2020 – Morning

Answer **any** FOUR questions out of SIX. All questions carry equal marks.

Time: TWO 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) Consider the following JavaScript code and identify **TEN** errors. [Note: the line numbers are for your benefit and are not part of the JavaScript code.]

```
1 <script type="text/javascript" language="JavaScript">
2
3 var yesterdayDate = new Date();
4 var todayDate = new Date();
5 var tomorrowDate = new Date();
6
7 var daysOfWeek, displayDays, today, yesterday, tomorrow;
8 daysOfWeek = ["Sunday", "Monday", "Tuesday", "Wednesday", "Thursday","Friday,
            "Saturday"];
9
10 displayDays = "<h2>Days of the Week</h2><ol>";
11 for (i= 0; i < daysOfWeek.size; i++){;
12 displayDays += "<li>"+ dayOfWeek[i]+"</li>";
13      }
14
15 displayDays + "</ol>"
16
17 yesterdayDate.setDate(yesterdayDate.getDate() -2);
18 tomorrowDate.setDate(tomorrowDate.getDate() +1);
19
20 yesterday = "<br>Yesterday was "daysOfWeek[yesterdayDate.getDay()];
21 today = "<br>Today is a "+daysOfWeek[todayDate.getDay()];
22 tomorrow = "<br>Tomorrow is a "+daysOfWeek[tomorrowDate.getDays()];
23
24 documents.getElementById("Today").innerHTML = displayDays+" "+yesterday+" "+today
            + " "+tomorrow;
25 </script>
```

Output of the code when fixed

Days of the Week

1. Sunday
2. Monday
3. Tuesday
4. Wednesday
5. Thursday
6. Friday
7. Saturday

Yesterday was Monday
Today is a Tuesday
Tomorrow is a Wednesday

(10 marks)

[Turn Over]

b) Using a nested for loop (a ‘for’ loop inside a ‘for’ loop), write JavaScript code that will output the following table:

1x1=1	2x1=2	3x1=3	4x1=4	5x1=5
1x2=2	2x2=4	3x2=6	4x2=8	5x2=10
1x3=3	2x3=6	3x3=9	4x3=12	5x3=15
1x4=4	2x4=8	3x4=12	4x4=16	5x4=20

(10 marks)

c) i) State **TWO** benefits of putting JavaScript code inside a function.

(2 marks)

ii) State **THREE** benefits of putting JavaScript code in an external file.

(3 marks)

A2.

a) In the context of web design, what is a framework and how does it benefit the designer?

(6 marks)

b) Identify **TWO** differences between static and dynamic web pages.

(4 marks)

c) In the context of web applications, describe the following terms and what part they play in the application.

i) Roles;
ii) Authorisation;
iii) Authentication;
iv) Permissions;
v) Users.

(10 marks)

d) Draw a labelled diagram of the architecture of a web application, showing the relationship between the client side and the server side.

(5 marks)

[Turn over]

A3.

a) What is the XML declaration and how does it identify the document as being XML? Provide XML syntax for the declaration in your answer and briefly explain the **THREE** parameters you used.

(9 marks)

b) State **TWO** reasons for using an XML schema.

(4 marks)

c) In relation to XML data modelling:

- model a data source intended for a cinema;
- model the film title, age rating, and length of the film that is being shown in the cinema;
- provide XML mark-up for a film.

(8 marks)

d) How does the AJAX model allow for an XML document to be sent from a web server?

(4 marks)

[Turn Over]

Section B
Answer Section B questions in Answer Book B

B4.

a) Expand each of the following acronyms:

i) FTP;
i) DHCP;
ii) ARP;
iii) ICMP;
iv) DNS;
v) IP.

(6 marks)

b) Map the **SIX** protocols given in part a) above to the layers of the TCP/IP model.

(6 marks)

c) **UDP** and **TCP** are two protocols seen within the transport layer of the TCP/IP model.

i) Expand the acronyms TCP and UDP.

(2 marks)

ii) Compare and contrast UDP and TCP. In your answer, discuss technologies that make use of these **TWO** protocols, and why their usage within these technologies is appropriate.

(5 marks)

iii) Draw a diagram that illustrates how TCP establishes a connection between a client and server. You must demonstrate the **three-way handshake** in your answer.

(6 marks)

B5.

a) Expand the acronym **VPN.**

(1 mark)

b) Briefly discuss **TWO** advantages and **TWO** disadvantages of using a VPN**.**

(4 marks)

c) **IPSec** is mandated in IPv6, unlike IPv4.

i) Expand the acronym IPSec and state what layer of TCP/IP model does IPSec map to.

(2 marks)

ii) Discuss why IPSec was mandated in IPv6 and the benefits this provides.

(4 marks)

iii) Excluding IPSec, compare and contrast IPv4 and IPv6.

(5 marks)

[Turn over]

d) This question concerns IPv6 and IPv4 notation.

i) Rewrite the following IPv6 address to its most compact form:

9aa1:8921:0000:0000:0010:0000:0000:e011

(2 marks)

ii) What do **::/0** and **::1/128** represent in IPv6 notation?

(2 marks)

iii) Provide an equivalent IPv4 address for IPv6's **::1/128**.

(2 marks)

e) Discuss the implications of IPv6 in regards to **Network Address Translation** (NAT).

(3 marks)

[Turn Over]

B6.

a) Ransomware has affected several large institutions in the past year. Your manager is a computer novice and is concerned with the threat ransomware poses.

Write a report for your manager describing:

- what ransomware is;
- how it spreads;
- why it is a threat to the business;
- what you have done to prevent a ransomware attack;
- what measures are in place to mitigate damage to equipment, data and reputation in the event of ransomware being discovered on your network.

(10 marks)

b) Expand the following in the context of mobile/cell phone operation:

i) GSM;
ii) EDGE;
iii) 4G;
iv) WAP;
v) HSPA.

(5 marks)

c) The department of Life Sciences at the University of Sarre requires an 'environment monitoring station' to remotely and automatically obtain outside environmental data every 90 minutes in a 48 hour period. The environment being monitored is within a large, open field. The environmental data required includes ground moisture, current temperature and wind data which is to be sent to a mobile/cell phone application for dissemination.

You have been given the following hardware components (see bulleted list below), but it has been left up to you to decide the networking and data-interchange technology.

- Micro-computer (like a Raspberry Pi) with 8 USB 2.0 ports.
- External battery pack with a 25000mAh capacity.
- USB wind, moisture and temperature probes.
- A plastic weatherproof box to protect the electrical components.

At present, the device needs to send data back to the mobile/cell phone at a radius of around 50-75 metres.

Discuss, justify and critique the networking and data-interchange technologies you would utilise to satisfy the requirements set out above. Explain any assumptions you have made. You may draw diagrams to illustrate any point you are making.

(10 marks)

END OF EXAMINATION