BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

March 2017

PRINCIPLES OF INTERNET TECHNOLOGIES

EXAMINERS' REPORT

General Comments

This year there was an even split between those working on Section A and Section B questions. This is a pleasing improvement from previous years where candidates have been relying too heavily on Section B questions.
Marks offered for questions are, for the most part, indicative of the length of the answer expected. For example, a two-mark question should require 2-3 sentences at most. Too often, candidates write a page for a two-mark question, and given candidates need to answer four questions in two hours, this is an immense waste of time that could be better spent on higher mark questions.

Section A
Answer Section A questions in Answer Book A

A1. **a)** In relation to JavaScript, briefly state what each of the following terms refer to:
- i)   Comparison Operators
- ii)   Modulus
- iii) Classes
- iv)   Strings
- v)   IndexOf

(5 marks)

b) Consider the following JavaScript code and identify 5 errors:

```
<script type="text/javascript" language="javascript">
var info = "Counting... <br/";
 document.write(info);

for(i = 1, i <= 10; i++){
        info = "Counter i = " + x + "<br/>";
       document.print(info);


    document.write("<br/> End of count");
</script>
```

(5 marks)

c) Once corrected the purpose of the code in part (b) is to output numbers from 1 to 10 in **ascending** order using a *for* loop. Accordingly, rewrite the code

- to output the numbers from 10 to 1 in **descending** order using a *while* loop instead of a *for* loop

- and ensure that each number is stored in an *array* inside the *while* loop and that the total of the numbers stored in the *array* is outputted as well.

(15 marks)

A1. Answer Pointers

a)   A brief statement correctly defining each term.

b)
```
<script type="text/javascript" language="javascript">
            var info = "Counting... <br/"; (1)
             document.write(info);

         for(i = 1, i <= 10; i++){ (2)
             info = "Counter i = " + x + "<br/>"; (3)
            document.print(info); (4)
            (5)

            document.write("<br/> End of count");
</script>
```

1. Break tag not closed
2. For loop needs a ; and not a ,
3. x is not declared as a variable. Should be i instead.
4. document,print is not a recognized method
5. for loop is not closed

1 mark per error, 5 in total

 c)

```
var info = "Counting... <br/>";
document.write(info);
var array1 = new Array(10);              3 marks
var total = 0; //    1 mark
var i=10; //    1 mark
while (i >0){ //     1 mark
     info = "Counter i = " + i + "<br/>";     1 mark
   document.write(info);//     1 mark
```

2

```
        array1[i] = i;                2 marks
        total = total + array1[i];   2 marks

        i--;//   1 mark
}
document.write("<br/> End of count");

document.write("<br /> The total is " +total);   2 marks
```

A1. Examiners' Guidance Notes

This question was the least attempted with only part (b) being answered well.
There was a lack of understanding by the candidates who attempted to state what
terms were in part (a). Few students knew what a while loop was in part (c) and many
just repeated the code provided in part (b).

A2.   **a)**   State TWO benefits of using CSS.

(4 marks)

b)   How and where should an external stylesheet be referenced in a web
page? Provide appropriate HTML code in your answer.

(6 marks)

c)   What is the "box model" in CSS and what does it consist of?

(5 marks)

d)   Write CSS rules that will do the following:

i)   Change the background colour of a web page to black
ii)   Change the text font of all hyperlinks to Calibri
iii)   Change more than one element to having a width of 100%

(6 marks)

e) Write a declaration for the rule in d)iii) to show how it can be applied to a
particular element.

(4 marks)

A2. Answer Pointers

a) Advantages include Pages will load faster, more control than HTML, CSS can be
used on multiple pages thus saving development time and making it easy to maintain
2 marks each, 4 in total

b) Should be referenced using the LINK tag and placed in between the HEADER
tags.

```
<head>
<link rel="stylesheet" href="Styles/StyleSheet.css">
```

```
</head>            6 marks
```

c)
it's a box that wraps around each HTML element.   2marks
it consists of margins, borders, padding (and content)   3 marks (5 marks total)

d)
i) `body {`
` background-color: black`
`}`
ii) `a { font-family: Calibri;`
`}`
(iii)   `.ex{`
           `width:100%;`
              `}`   6 marks

(e) `<p class="ex">Lorem epsum</p>`   4 marks

A2. Examiners' Guidance Notes

This was the most popular question in Section A and candidates answered parts (a) and part (b) well. However in part (c) candidates could draw a box model and what it consisted of but were unable explain why it was used in CSS. In part (d), most were able to write rules but some candidates did not seem to understand how apply a rule to many elements at one time. Part (e) was not answered well and few candidates attempted this question.

A3. **a)**   What does XML stand for and what is it designed to do?

(4 marks)

b)   State TWO benefits of using XML.

(4 marks)

c)   What does the term DOM mean? Outline the role it plays in regards to XML.

(4 marks)

d)   In relation to XML data modelling:
- model a data source intended for a sheep *farm*: and
- model the *ID , breed,* and *age* for the details of each *sheep* that is to be held in the *farm* system and
- provide XML mark-up for a *sheep*

(8 marks)

e)   Provide a XML DOM Node Tree view for the XML you wrote in part d)
(5 marks)

A3. Answer Pointers

a) Extensible Markup Language. Designed to store and transport data. 4marks
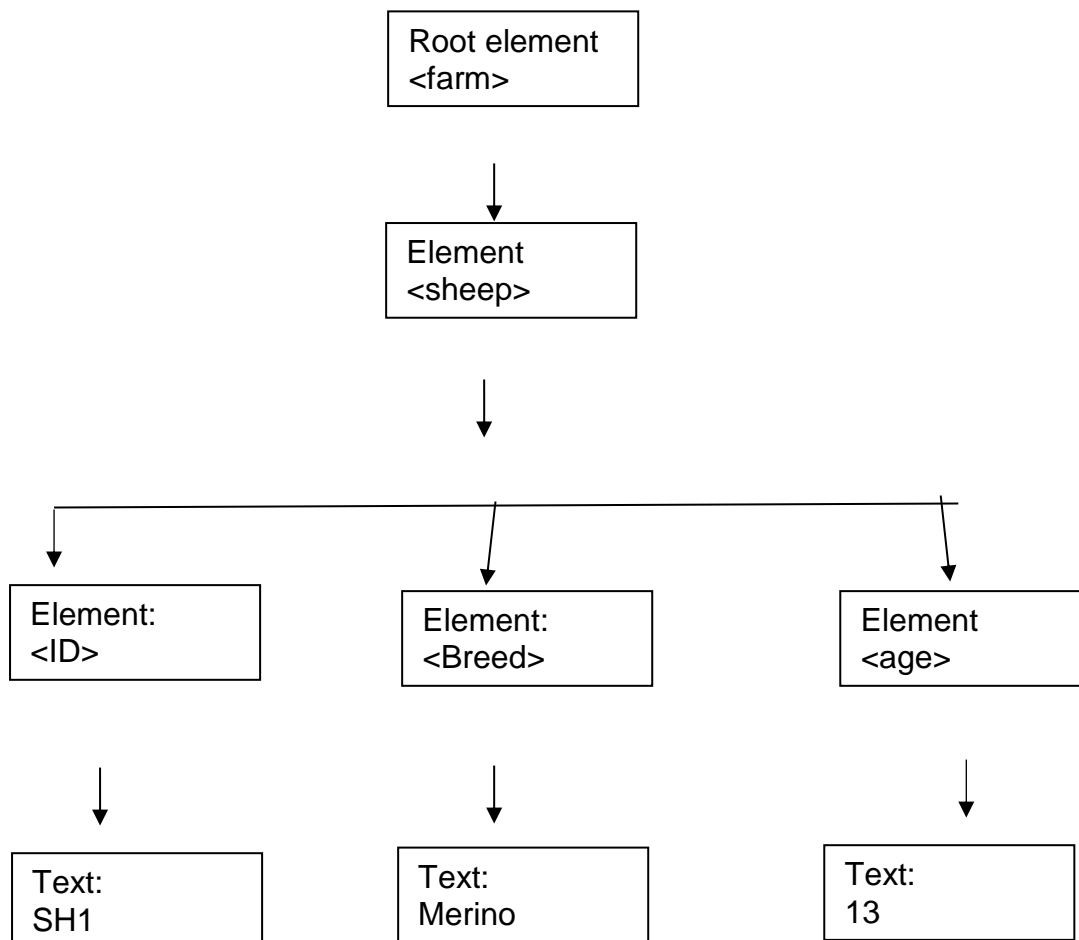
b) User defined tags, allows for data to be exchanged across incompatible system, humans and machines can read it etc.   4 marks

c) Document Object Model – defines a standard for accessing documents like XML.   4 marks

d)
```
<?xml version="1.0" encoding="UTF-8"?>
<farm>
     <sheep>
          <ID>SH1</ID>
          <breed>Merino</breed>
          <age>13</age>
     </sheep>
</farm>
```
8 marks

e)

Root element
<farm>

↓

Element
<sheep>

↓

Element: <ID>	Element: <Breed>	Element <age>
↓	↓	↓
Text: SH1	Text: Merino	Text: 13

5 marks

5

A3. Examiners' Guidance Notes

This was the second most attempted question in Section A and the one that showed the strongest performance by candidates. Candidates typically answered parts (a) and (d) well. However, in part (b), answers tended to be a description of XML rather than stating the benefit of XML. Part (c) was mostly answered well but in part (d) there needed to be a better understanding of what a node tree is.

Section B
Answer Section B questions in Answer Book B

B4. **a)** Expand each of the following acronyms:

    i) TLS
    ii) TCP
    iii) SSH
    iv) IP
    v) ARP
    vi) FTP

(6 marks)

b) Show how the six protocols listed in part a) map onto the TCP/IP model.

(6 marks)

c) UDP is described as a connectionless protocol.
    i) Expand the acronym 'UDP'

(1 mark)

    ii) What is meant by the term 'connectionless' in reference to UDP?

(2 marks)

    iii) Provide TWO applications that utilise UDP and briefly explain why they benefit from using UDP.

(4 marks)

d) Briefly explain the difference between HTTP and HTTPS.

(2 marks)

e) Draw a labelled diagram illustrating the role of FTP.

(4 marks)

B4. Answer Pointers

a)
TLS - Transport Layer Security
TCP – Transmission Control Protocol
SSH – Secure Shell

6

IP - Internet Protocol
ARP – Address Resolution Protocol
FTP – File Transfer Protocol

(6 marks)

b)

Protocol	TCP/IP Layer
TCP	Transport Layer
TLS	Application Layer
SSH	Application Layer
IP	Internet layer
ARP	Internet Layer
FTP	Application Layer

(6 marks)

c)

User Datagram Protocol
No connection is established beforehand
Any two applications that use UDP acceptable. Games/VPN/Streaming are the most
obvious choices.   (7 marks)

d) HTTPS (Hypertext Transfer Protocol Secure) transmits data securely in
conjunction with TLS on TCP port 443, whereas HTTP is not secured and transmit
over TCP port 80.   (2 marks)

e) FTP – File Transfer Protocol – allows for the transfer of files between computers
on a network. For example, a webmaster that hosts software will need to use FTP to
                                                                                    (3 marks)

B4. Examiners' Guidance Notes
This was the most popular question in Section B and was, largely, answered well by
most candidates. For part a) candidates were asked to expand the acronyms for
common protocols, with a good number of candidates gaining at least some marks for
this question. TLS (Transport Layer Security), however, was often incorrect. Part b)
asked candidates to map the protocols seen in part a) to the TCP/IP and this was
generally answered well, but it was common to see several mapped incorrectly.
Protocols and how they map to the TCP/IP is an important aspect of networking. Part
c) tested if candidates could understand a fundamental protocol (UDP) for
transmission and, largely, candidates were able to provide good answers to part c)i)
and c)ii). The answers that provided applications that utilise UDP, which part c)iii)
asked, were too frequently incorrect or showed a misunderstanding of UDP. Given
how important UDP is, being able to provide examples of its usage is crucial. Part d)
was generally answered well by candidates, but some candidates wrote far too much
when answering this question; given that it's only two marks, a couple of sentences,
maximum, is all that's required. Part e) was the weakest answered question and while

many who attempted scored one mark, many diagrams lacked detail necessary (such as how the connection is established, password may be required, FTP port number etc.) meaning few candidates scored more than two marks for this question.

B5. **a)** What is SMTP and what role does it play when using e-mail?

(2 marks)

b) IMAP and POP3 are two protocols that operate in conjunction with SMTP.

    i) What do IMAP and POP3 stand for?

(2 marks)

    ii) Explain why SMTP needs to be used with IMAP or POP3 .

(2 marks)

    iii) Compare and contrast IMAP and POP3.

(5 marks)

c) What is meant by the term 'Web accessibility' and why is Web accessibility important?

(4 marks)

d) Describe what is meant by the term Wiki, and highlight an advantage and disadvantage of the Wiki model.

(3 marks)

e) i) Expand the acronym 'URL'.

(1 mark)

    ii) Given the example URL below, identify its component parts:
`http://www.example.com:80/search?q=search+term#part3`

(6 marks)

B5. Answer Pointers

a) SMTP - Simple Mail Transfer Protocol. The protocol used to send e-mail between servers.

(2 Marks)

b)

    i) IMAP - Internet Message Access Protocol, POP3 - Post Office Protocol, version 3

(2 Marks)

    ii) SMTP is used to send messages from a mail client to a mail server (i.e.; it is a delivery protocol only). It does not retrieve e-mail, hence the need for another protocol.

(2 Marks)

    iii) POP3 downloads e-mails to your computer/device and messages are deleted from the server once downloaded (so that means you can only view them on one device). As POP3 downloads the e-mail to your device/computer, storage is limited only by the space available on that device. With IMAP, all mail is stored on a server which means you can view your e-mail from a multitude of devices. However, your storage is limited to how generous your service provider is. Both are used to retrieve mail.

c) Web accessibility aids those with disabilities (hard of sight/hearing or physical disabilities that prevent them from using standard inputs) by removing the barriers that prevent reasonable interaction with a website. It's important as the web was designed to be inclusive, and poor accessibility imposes unnecessary barriers to those with disabilities.

(4 marks)

d) A Wiki is a website which can be collaboratively worked on, allowing for many users to add or edit content. The advantages are anyone can add content, from which the Wiki software will keep track of *changes. The advantage can also be a disadvantage, unless content is reviewed and verified, anyone can put items in a wiki.*

(3 Marks)

e)
i) Uniform Resource Locator

(1 Mark)

ii) scheme://domain:port/path?query#fragment

(6 marks)

B5. Examiners' Guidance Notes
Part a) was generally answered well with candidates identifying that SMTP stands for Simple Mail Transfer Protocol. However, SMTP's role was answered incorrectly by many candidates who stated that it was to both send a receive e-mail. SMTP's job is to send mail only. Part b) was about mail retrieval protocols IMAP and POP3. The IMAP (Internet Message Access Protocol) acronym was frequently expanded incorrectly to Internet **Mail** Access Protocol, and while it was previously known as that (see RFC 1064) only one mark was available here so absolute correctness was key. There was a split between those candidates who understood why IMAP/POP3 are used with SMTP, but those who provided a wrong answer in part a) invariably got part b)ii) wrong, too. Most candidates who attempted part b)iii) gained a couple of marks, but many did not provide enough depth in comparing and contrasting the protocols; although those that did score highly on this question gave excellent answers. Part c) provided interesting answers. This question wanted candidates to identify possible accessibility issues of websites to those with disabilities, and for top marks, tie in the W3C and their recommendations. However, a number of candidates thought this question was about Internet access, and why the Internet was important: this scored no marks. Part d) was a good opportunity to score top marks, which many candidates achieved. However, some candidates answered that a Wiki literally means Wikipedia, and while Wikipedia follows the Wiki model, it is not the definition of "Wiki". Part e) i) was generally answered correctly, but part e)ii) candidates would, invariably, get some aspect of the URL wrong, although candidates who attempted it usually obtained a couple of marks.

B6. **a)** Discuss how the following FIVE network utility tools can be used to assist a network administrator in determining performance issues within a computer network. In your answer, provide a brief explanation on how each utility can assist an administrator.

      i) ping
      ii) tracert
      iii) nslookup
      iv) netstat
      v) ipconfig

(15 marks)

b) A manager from a small business has asked you to implement a 'disaster-recovery plan' for their computer network. The manager has requested you to write a short report that provides THREE potential disasters a computer network can face, and what you can do to prevent or mitigate significant data loss and/or network downtime.

(6 marks)

c) Compare and contrast static and dynamic IP addresses and briefly explain when each is appropriate.

(4 marks)

B6. Answer Pointers

a)

i) ping – Uses ICMP (Internet Control Message Protocol), a simple error reporting protocol enabling computers to report routing errors.
ii) Tracert – Follows possible paths datagrams take when travelling from their origin to their destination. Tracert uses the ICMP protocol to identify every router on its journey and by manipulating the Time to Live, tracert gives the final total of routers a packet gas passed through, allowing an administrator to check for bottlenecks.
iii) Nslookup – Allows an admin to query any specified DNS server for a DNS record. No response may mean an issue with the name server.
iv) Netstat – Allows an administrator to see stats related to IP, TCP, UDP and ICMP. It can also display numerical counts for each item (using –s flag), such as number of datagrams sent and received.
v) Ipconfig – ipconfig (using /all) allows an administrator the see details such as host name, physical address and IP address. However, using the /flushdns command can be used to clear the DNS cache. /release and /renew release the IP address and obtain a new one respectively from the DHCP server.

b) Any reasonable disaster and solution acceptable. Power outages, sabotage, natural disaster etc.

c) Static IP addresses don't change, useful for printer. Dynamic IP address change, useful for ISPs.

B6. Examiners' Guidance Notes

Part a) was a high mark question and some candidates provided exceptional and in-depth answers to the network utility tools, even so much as to provide their UNIX-based counterparts. However, for a good number of candidates, many attempted to make educated guesses around the names of these tools and, occasionally, stumbled on a mark or two. Many provided incorrect explanations of the tools. For a 15 mark question, it's a big risk to try and bluff the way to an answer, particularly when the tools are well established and what they do is well defined. Part b) was another opportunity to get top marks, and a good number did. However, some candidates would provide three similar disasters meaning credit was already awarded for a previous "disaster". E.g. saying "worms, viruses and trojans" falls under the umbrella of malicious software, and given there were ample disasters that a network can face, this wasn't enough to satisfy granting more than one mark for. Those who provided good potential disasters would often provide good solutions to mitigate downtime. Part c) was rarely answered well, but candidates would usually provide enough of an answer to get a couple of marks as candidates were able to establish what "static" and "dynamic" meant.