

BCS THE CHARTERED INSTITUTE FOR IT
BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT
PRINCIPLES OF INTERNET TECHNOLOGIES

April 2015

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.

General Comments

In previous reports, we have noted that many candidates answer more questions from section B than section A. This remains the case for this sitting.

Candidates were strongest on recall based questions, and less so in practical aspects. Within the practical tasks, candidates were strongest on HTML and CSS and weakest in relation to JavaScript.

Other issues continue to include illegible handwriting and answering questions different to those set.

Section A

Answer Section A questions in Answer Book A

A1. a) In relation to Web authoring, expand each of the following terms, as necessary and describe the role they play:

- i) HTML
- ii) CSS
- iii) JavaScript
- iv) PHP
- v) MySQL

(5 marks)

b) Show the relationship between the technologies in part a) using a sketch of a client-server model that shows where each of the above technologies reside and the connections between them.

(10 marks)

c) Consider the following JavaScript function and identify 10 errors:

```
getCookie() {  
  
    var start = document.cookie.indexOf(name + "=");  
  
    var len = start + name.length + 1;  
  
    if ((!start) && (name != cookie.substring(0,  
        name.length))) {  
        return null;  
  
    if (start == -1)  
        return null  
  
    var end = document.cookie.index Of('; ' len);  
  
    if (end = -1)  
        end == document.cookie.length;  
  
    unescape(document.cookie.substring(len, end));  
}
```

(10 marks)

Answer pointers (A1)

a) i to v

A brief statement correctly defining each term.

1 mark each

Total 5 marks

b)

A sketch of a client-server model with each technology shown and connected accordingly. As a guide, 1 mark for placement of each technology and 1 mark for the relationship each have to other parts of the model.

Total 10 marks

c)

```
function getCookie(name) {
    var start = document.cookie.indexOf(name + "=");
    var len = start + name.length + 1;
    if ((!start) && (name != document.cookie.substring(0,
name.length))) {
        return null;
    }

    if (start == -1)
        return null;
    var end = document.cookie.indexOf(';', len);
    if (end == -1)
        end == document.cookie.length;
    return unescape(document.cookie.substring(len, end));
}
```

1 mark for each error

Total 10 marks

Examiners' Guidance Notes (A1)

Candidates tended towards answering this question in Section A. Candidates were typically stronger on recall based elements than practical aspects.

They largely answered part a well, although many did not describe MySQL well. Part B was often answered correctly but with a lack of detail. Part C was showed variable success, with a few obvious errors spotted by most. It was common to see correct code highlighted as errors.

- A2. a)** State what the term XMLHttpRequest stands for and briefly explain how it is commonly used in Web development. Identify ONE strength and ONE weakness of the approach. **(5 marks)**
- b)** Using only a labelled diagram, illustrate the architecture of a typical AJAX web application, showing the relationships between each of the elements in the system and how data is passed between them. **(10 marks)**
- c)** In relation to XMLHttpRequest, briefly describe the purpose of a 'request method' and identify and briefly describe THREE of the request methods commonly supported by user agents that support XMLHttpRequest. **(10 marks)**

Answer pointers (A2)

a)

A statement covering that XMLHttpRequest is a client side scripting API used to update the DOM without refreshing the document. Identifying a strength and weakness of the approach.

1 mark for defining the term
2 marks for describing its use
1 mark for a strength
1 mark for a weakness
Total 5 marks

b)

A clearly labelled diagram showing:

- Server-side: web server, data source and scripting elements.
- Client-side: browser, DOM markup and scripting elements.
- Relationships between elements, including asynchronous connection.

Total 10 marks

c)

Possible request include: methods GET, POST, PUT, DELETE, HEAD

1 mark for describing the purpose of a request method
1 mark for each method identified x3
2 mark for each correct description x3
Total 10 marks

Examiners' Guidance Notes (A2)

This question was seldom attempted and when taken it was common for only a few parts to be attempted. Most candidates could describe the XMLHttpRequest but few could illustrate its use. Performance in relation to Request methods was variable.

A3. Consider the HTML markup and CSS style sheet listed at the end of this question.

a) Identify FIVE errors in the HTML markup. **(5 marks)**

b) Identify FIVE errors in the CSS style sheet. **(5 marks)**

In relation to making use of the CSS provided:

i) Write the HTML markup needed to allow the HTML markup to make use of the CSS style sheet and indicate the line number it would be inserted after.

ii) What term is used to refer to this method of applying a style sheet to HTML markup?

iii) Identify TWO alternative methods of applying style sheet rules to HTML markup. **(5 marks)**

d) Briefly describe the effect that each of the following styles defined in the CSS provided will have on the HTML markup provided:

- i)** html style
- ii)** h1 style
- iii)** h2 style
- iv)** p style
- v)** the three a styles

(5 marks)

e) A CSS class name panel is included in the style sheet and used in the HTML markup provided:

i) What effect does this panel class have on the layout of the rendered HTML elements?

ii) Identify a significant problem with the provided style sheet in relation to responsive Web design.

iii) Briefly state why responsive Web design is important. (5 marks)

cricket.html - HTML Markup for question A3

(line numbers have been added to ease making reference to the code in your answers)

```
1  !doctype html
2  <html>
3
4  <head>
5      <title>Cricket for beginners</title>
6      <link rel="stylesheet" href="cricket.css">
7
8  </head>
9
10 <body>
11
12     <h1>Cricket for beginners
13
14     <div>
15         <p>
16             Description of cricket goes here..
17         </p>
18     </div>
19
20     <div class="panel">
21         <h2><a href="cricketpitch.html">Cricket pitch</a></h2>
22         <ul>
23             <li>Wickets</li>
24             <li>Creases</li>
25             <li>Playing surface</li>
26             <li>Stumps</li>
27             <li>Bails</li>
28             <li>Bat and ball</li>
29         </ul>
30     </div>
31
32     <div class="panel">
33         <h2><a href="rulesofplay.html">Rules of
34 play</a></h2>
35         <ul>
36             <li>Rules</li>
37             <li>Umpires</li>
38             <li>scorers</li>
39         </ul>
40     </div>
41
42     <div class="panel">
43         <h2><a href="teamstructure.html">Team
44 structure</a></h2>
45         <ul>
46             <li>Batsman</li>
```

```

45         <li>Bowler</li>
46         <li>Captain</li>
47         <li>Wicket-keeper</li>
48         <li>Fielder</li>
49     </ul>
50 </div>
51
52 <div "panel">
53     <h2><a href="gameplay.html">Game play</a></h2>
54     <ul>
55         <li>Innings</li>
56         <li>Overs</li>
57         <li>Bowling</li>
58         <li>Fielding</li>
59         <li>Batting</li>
60         <li>Runs</li>
61     </ul>
62 </div>
63
64 </body>
65
66 </html>

```

cricket.css - CSS Style Sheet for question a3

(line numbers have been added to ease making reference to the code in your answers)

```

1  html {
2      color: #000;
3      font-size: 1em;
4      line-height: 1.2;
5  }
6
7  h1 {
8      font-family: sans-serif;
9      font-size: 2em;
10     color: #fff;
11     background-color: #494;
12     min-height: 250px;
13 }
14
15 h2 {
16     font-family: sans-serif;
17     font-size: 1.25em;
18 }
19
20 p
21     font-family= serif;
22
23

```



```

24  A {
25      color: #494;
26      text-decoration: underline;
27  }
28
29  a:hover {
30      color: 7c7;
31      text-decoration: none;
32  }
33
34  a active {
35      color: #7c7;
36      text-decoration: none;
37  }
38
39  .panel {
40      float:left;
41      margin: 10px;
42      padding:5px;
43      min-width: 200px;
44
45  }

```

Answer pointers (A3)

a)

```

1      <!doctype html>
8      </head>
12     <h1>Cricket for beginners</h1>
21         <h2><a href="cricketpitch.html">Cricket pitch</a></h2>
52     <div class="panel">

```

1 mark for each error

Total 5 marks

b)

```

20  p {
21      font-family= serif;
22  }
24  A {
30      color: #7c7;
34  a:active {

```

1 mark for each error

Total 5 marks

c)

2 marks for correct link tag and 1 marks for correct insertion point

1 mark for correctly identifying External style sheet use.

1 mark (x2) for identifying Internal and Inline style sheet use.

Total 5 marks

d)

1 mark for each correctly described style effect x5

Total 5 marks

e)

2 marks for correctly described effect.

2 marks for identifying the float issue for smaller screens.

1 mark for a brief description of why responsive Web design is important.

Total 5 marks

Examiners' Guidance Notes (A3)

This was the second most attempted question in Section A and the one that showed the strongest performance by candidates. Candidates did well at spotting the HTML and CSS errors. As well as at writing the HTML, markup needed to make use of the CSS. They were also quite strong at identifying the different approaches to applying CSS to HTML. Candidates also did reasonably well at describing the effects of the CSS but almost all failed to mention the cascading nature of the rules. Only a few candidates were able to correctly describe the behaviour and limitations of the CSS in part e. Few candidates seemed to recognise and understand the importance of responsive Web design.

Section B

Answer Section B questions in Answer Book B

- B4. a)** The terms Internet and World Wide Web are frequently used as if they are the same thing. Give a definition for each term that makes the distinction clear. **(4 marks)**
- b)** Give three examples of the use of the client-server model on the Internet. Ensure that you have made it clear which is the client and which is the server in your answer. **(6 marks)**
- c)** Give three methods of establishing a data connection to an Internet service provider. For each, give an example of a situation when the method would be appropriate and an example of a situation when the method would be inappropriate. **(9 marks)**
- d) i)** Define the term web portal and give an example.
- ii)** Outline the main characteristics of a portal.
- iii)** Give two application areas for portals. **(6 marks)**

Answer Pointers (B4)

a)

The Internet is a collection of thousands of interconnected networks which cooperate with common protocols so that information can be passed across them. (2 marks)

The World Wide Web is an application which runs on the Internet using client-server architecture. (2marks)

b)

Client	Server
Web browser	Web server
Email client	POP/IMAP/SMTP server
FTP Client	FTP Server
News reader programme	News server etc.

c)

Method	Appropriate	Inappropriate
Dialup	Remote areas with telephone line but too far for ADSL	If a fast connection is necessary e.g. VoIP. Mobile applications
ADSL/VDSL	For fast connections close to exchange/cabinet	Where line length is too great. Mobile applications
Cable	For fast connections when service available	If area not cabled! Mobile applications
WiFi	For mobile applications	For static applications where other methods would provide a faster and more reliable connection

d) i) A web portal is a web site, which allows access to diverse information from the web in a unified way. Examples may include Yahoo, MSM and the like.

(2marks)

d) ii) Main characteristics include consistent look and feel, the ability to configure and personalise.

(2marks)

d) iii) Application areas include Government, Corporate, Regional, Sector specific e.g. estate agents.

(2marks)

Examiners' Guidance Notes (B4)

This was the least popular question in section B with the lowest average mark. Some candidates were unable to differentiate between the WWW and the Internet in part a). In part b) the client-server model was usually well understood although there were notable exceptions with one candidate referring to the client as "a little boy". Candidates were generally able to state Internet connection methods but did not always answer the question by providing the appropriate and inappropriate situations. In part d) some candidates had little understanding of web portals.

- B5. a)** What do the following terms stand for?
- i)** DNS
 - ii)** XML
 - iii)** FTP
 - iv)** GIF
 - v)** HTTP
 - vi)** NAT
- (6 marks)**
- b)** Define and briefly explain the role of:
- i)** ISP
 - ii)** W3C
 - iii)** ICANN
 - iv)** ISOC
- (8 marks)**
- c)** Explain what is meant by:
- i)** a packet switched network
 - ii)** a circuit switched network
- Which of these applies to the Internet?
- (5 marks)**
- d)** Explain the role of a web crawler (spider).
- (4 marks)**
- e)** Explain why two different search engines may return different results when given the same search terms.
- (2 marks)**

Answer Pointers (B5)

- a)**
- i)** DNS – Domain Name System
 - ii)** XML – eXtensible Markup Language
 - iii)** FTP – File Transfer Protocol
 - iv)** GIF – Graphics Interchange Format
 - v)** HTTP - Hypertext Transfer Protocol
 - vi)** NAT – Network Address Translation
- b)**
- i)** ISP -- Internet Service Provider – sells connections to the Internet
 - ii)** W3C - World Wide Web Consortium - develops standards for the WWW
 - iii)** ICANN - Internet Corporation for Assigned Names and Numbers – coordinates DNS and IP addressing
 - iv)** ISOC - Internet Society - guides the direction of the Internet and its growth.

c) i)

A packet switched network is one where there is no single unbroken connection between sender and receiver. Information is broken into packets which are sent over various routes and reassembled at the destination. (2 marks)

c) ii)

A circuit switched network is one where once the connection is made, that part of the network is dedicated to the single connection (2 marks)

The Internet is packet switched. (1 mark)

d)

A web crawler is an automated program or script, which browses the World Wide Web in a methodical, automated manner in order to create an index of pages. It identifies the URLs in a page and adds them to a list of pages to visit.

e)

They may have a different weighting for the relative importance of the elements of the search terms. The indexes depend on the way that the web crawlers have searched the web, which will obviously differ from site to site.

Examiners' Guidance Notes (B5)

This was a popular question in part B and most candidates performed relatively well. Part a) was generally well answered although some candidates struggled with GIF. Many candidates were unfamiliar with ICANN but most answered part b) well. Some candidates were confused about circuit switched networks and referred to packets as well as stated that the method was used on the Internet. The understanding of web crawlers was patchy with some candidates referring to them as malware. Others knew of the connection with search engines but wrongly believed that they were invoked at the point of making a search. In Part e) candidates provided a range of answers many of which were correct.

- B6. a)** Explain the role of DNS in the operation of the Internet. **(5 marks)**
- b)** State and explain the specialist email protocols used in the sending and retrieving of an email. **(4 marks)**
- c) i)** Explain the role of VDSL in broadband Internet access. **(5 marks)**
- ii)** What is the main advantage of VDSL compared to ADSL? **(1 mark)**
- d)** Outline TWO routing methods used on the Internet.

(4 marks)

e) i) Explain the main reason for the introduction of IPv6.

(3 marks)

ii) What is the importance of NAT in the context of IPv4?

(3 marks)

Answer Pointers (B6)

a)

DNS performs address resolution

- Hierarchy
- Local name servers
- Root domain servers
- Primary/secondary name servers

b)

Protocol	Role
SMTP	Sending and relaying
POP3	Retrieval
IMAP	Retrieval

c)

Very high bit-rate (speed) digital subscriber line (VDSL) is a development of ADSL to provide high speed Internet access over normal copper telephone lines and coaxial cable as used for cable TV. Performance degrades with increasing line length. Typically fibre optic cable is used between the exchange and roadside cabinet, known as FTTC (Fibre to the cabinet/curb).

Speed

d)

In static routing, the routing table has specific paths to specific destinations which don't change according to network traffic. Dynamic routing allows packets to have multiple routes to a destination according to network conditions. The routing table is built dynamically by routing protocols which change according to network traffic and conditions.

e) i)

The main reason for the development of IPv6 is to deal with the problem of IPv4 address depletion. It uses 128 bit addressing compared to the 32 bit addressing of IPv4 allowing for 2^{28} addresses instead of 2^{32} .

e) ii)

With the expansion of the Internet, the IPv4 address space is becoming exhausted. NAT allows internal networks to share IP addresses.

Examiners' Guidance Notes (B6)

This was another popular question although many candidates struggled to go beyond address resolution in part a). Given that five marks were available

candidates were expected to provide a good level of detail of the operation of DNS. For part b) some candidates cited protocols such as http or ftp but these are not email specific. In part c) the technical understanding of VDSL was generally weak with some candidates unable to even correctly attribute the V of VDSL. For part d) it was expected that candidates would outline dynamic and static routing. Past reports have noted that candidates confuse these methods with dynamic and static IP address allocation and this remained a problem for this paper. In part e) most candidates correctly referred to IP address depletion caused by the growing number of devices connected to the Internet. With reference to NAT, they did not always make it clear that in this context, internal IP addresses could be reused within networks across the Internet by sharing external IP addresses.