

S228/204

DUBLIN INSTITUTE OF TECHNOLOGY
KEVIN STREET, DUBLIN 8

BSC IN COMPUTER SCIENCE

YEAR 2

SUMMER EXAMINATION 2005

WEB DEVELOPMENT

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MAY 2005, 2:30 – 5:30

ATTEMPT **QUESTION 1** AND ANY **THREE** OTHER QUESTIONS

ALL QUESTIONS CARRY EQUAL MARKS.

Section A

Compulsory

1. Attempt any 5 of parts (a), (b), (c), (d), (e) and (f).

(a) (i) Provide the HTML code required to insert an image named `car.jpg` (shown in Figure 1.1) into a page, with the following requirements:

- When the user puts the mouse over the image (in most standard browsers) the alternative text “Beep beep!” should appear (shown in Figure 1.2).
- When the user clicks on the image the link `http://www.auto.com` should be opened.



Figure 1.1



Figure 1.2

(2 marks)

(ii) Provide the HTML code required to implement the following changes to the code from part (i):

- When the user clicks on the front wheel of the car the link `http://www.frontwheel.com` is opened.
- When the user clicks on the helmet of the driver the link `http://www.helmet.com` is opened.

Note: exact co-ordinates are not required – estimates are acceptable. The dimensions of the image in pixels are shown in Figure 1.3. State any assumptions you make regarding coordinates.

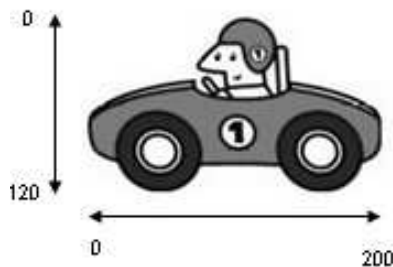


Figure 1.3

(3 marks)

- (b) (i) Describe the JavaScript *event model*. In your answer, you should be careful to distinguish between *events* and *event handlers*.

(2 marks)

- (ii) Write an HTML page that displays an image named “sunset . jpg”. When the user’s mouse is placed over the image its size is 200 pixels in width by 300 pixels in height. At all other times its size is 100 pixels in width by 150 pixels in height.

(3 marks)

- (c) (i) “JavaScript is an *interpreted, untyped* language, which distinguishes it from languages such as C++ and Java.”

Briefly explain the above statement.

(2 marks)

- (ii) Consider the following HTML page:

```
<html>
<head>
<script language="javascript">
    alert("Enter two numbers to be added")
    x = prompt("Enter x: ", 0);
    y = prompt("Enter y: ", 0);
    alert(x + y);
</script>
</head>
</html>
```

Using sample inputs, describe the behaviour of the JavaScript in the above page.

How would you correct the behaviour of the script?

(3 marks)

- (d) (i) “JavaScript is an object oriented language.” Discuss briefly.

(2 marks)

- (ii) Write a HTML page incorporating JavaScript that has the following behaviour:

- If the page is opened in Netscape the browser is redirected to net . html.
- Otherwise, if Java is *not* enabled, a small popup window (NOT and alert box) is created which tells the user to enable Java.

(3 marks)

- (e) (i) Provide and explain at least *two* reasons why web developers use style-sheet languages such as CSS in developing web sites.

(2 marks)

(ii) Consider the following two files:

q1e.html

```
<html>
<head>
  <link rel="stylesheet" type="text/css" href="x.css">
  <style type="text/css">
    h1 { color:purple }
    .nice_colour {
      color:red;
    }
    #nice_colour {
      color:yellow;
    }
    h2.nice_colour {
      color:green;
    }
  </style>
</head>
<body>
  <h1>
    <font color="black">
      What colour am I (ANS 1)?
    </font>
  </h1>
  <h1 style="color:blue">
    What colour am I (ANS 2)?
  </h1>
  <h1 class="nice_colour">
    What colour am I (ANS 3)?
  </h1>
  <h2 class="nice_colour">
    What colour am I (ANS 4)?
  </h2>
  <h2 id="nice_colour">
    What colour am I (ANS 5)?
  </h2>
  <h2>
    What colour am I (ANS 6)?
  </h2>
</body>
</html>
```

x.css

```
h1 { color:cyan }
h2 { color:pink }
```

When q1e.html is opened in a browser, what will be the colour of each of the headings in the body? Explain.

(3 marks)

(f) (i) “Rather than being a language for simply displaying web pages, XML is a markup language that can be used as a basis for other languages such as XHTML.”

Discuss briefly.

(2 marks)

(ii) Consider the following two files:

q1f.xml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<?xml-stylesheet type="text/xsl" href="style.xml"?>
<record-collection>
  <record>
    <band>Radiohead</band>
    <nationality>English</nationality>
    <name>The Bends</name>
  </record>
  <record>
    <band>Kylic Minogue</band>
    <nationality>Australian</nationality>
    <name>The Best of...</name>
  </record>
  <record>
    <band>Paddy Casey</band>
    <nationality>Irish</nationality>
    <name>Living</name>
  </record>
</record-collection>
```

style.xml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<xsl:stylesheet xmlns:xsl="http://www.w3.org/TR/WD-xsl">
<xsl:template match="/">
<html>
  <ol>
    <xsl:for-each select="record-collection/record">
      <li>
        <xsl:value-of select="name"/>
        <ul>
          <li><xsl:value-of select="band"/></li>
          <li><xsl:value-of select="nationality"/></li>
        </ul>
      </li>
    </xsl:for-each>
  </ol>
</html>
</xsl:template>
</xsl:stylesheet>
```

When q1f.xml is opened in a browser, what will be displayed in the browser window? Explain.

(3 marks)

Section B

Attempt any THREE Questions

2. (a) Compare and contrast *tables*, *layers* and *frames* as a means of organising the layout of a web page.

You should provide the advantages and disadvantages of each, as well as situations where you feel each format is useful, or should be avoided.

(6 marks)

- (b) Consider the three figures shown below.
- Figure 2.1 shows a set of nested tables.
 - Figure 2.2 shows a table with spanning cells.
 - Figure 2.3 shows a set of layers nested inside an outside, invisible layer.

Figure 2.1

Figure 2.2

Figure 2.3

Provide the HTML code necessary to produce each of the figures shown.

(9 marks)

Continued on the next page

- (c) Consider the framesets shown below.

Figure 2.4

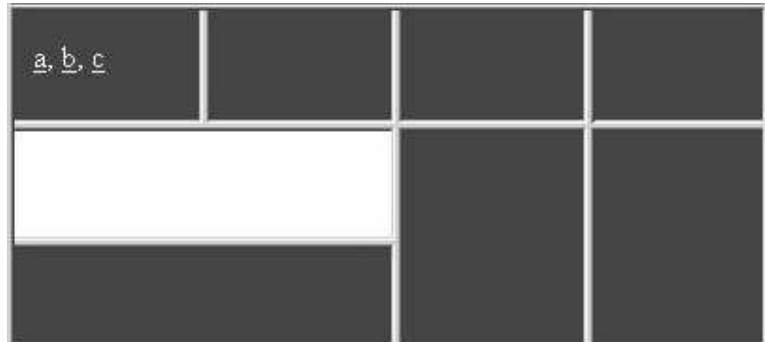


Figure 2.5

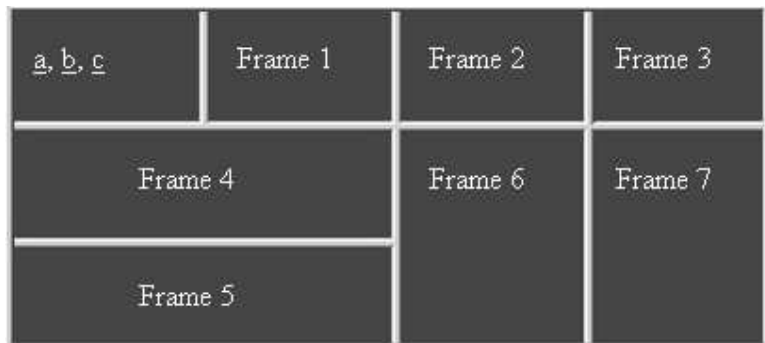


Figure 2.6

With reference to figures 2.4 – 2.6 you are required to do the following:

- (i) Produce the HTML code necessary to create the frameset shown in figure 2.4. The top left hand frame displays a page named `links.html`. All other frames display `black.html`.
- (ii) Show the changes to the HTML (in both `links.html` and the frameset) that are necessary to provide the following functionality:
 - When the user clicks on link `a`, the page `white.html` is displayed in frame 5 as shown in Figure 2.5.

Continued on the next page

- (iii) Implement a JavaScript function in the frameset page which will be called when the user clicks link `b`, and provides the following functionality:
 - The frame number is dynamically displayed in all frames, except for the one displaying the links, as shown in Figure 2.6.Show the changes necessary in `links.html` in order to call the function.

- (iv) Implement a JavaScript function in the frameset page which will be called when the user clicks link `c`, and provides the following functionality:
- The user is prompted to enter a frame number 1-7. They are then asked to confirm the number. If they confirm the number, then the frame with that number will display `white.html` (e.g. if they select 7 then the frame in the bottom-right corner will display `white.html`).
- (10 marks)**

3. (a) The World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI) is intended to ensure that web resources will be accessible to all. Describe the approaches taken by the WAI to attempt to reach this goal.
- (7 marks)**

- (b) *Organisation, navigation, page layout and choice of technology* are among the key decisions that must be made by a web designer.

Discuss the types of options available to the designer for each decision, and state why each decision is important for the site being developed.

(8 marks)

- (c) In 2003 Jakob Nielsen assessed the web-sites of several large companies and determined that the following list of items were among the issues that most required attention:
1. Emphasize what your site offers that's of value to users and how your services differ from those of key competitors
 2. Use a layout that lets users adjust the homepage size
 3. Use colour to distinguish visited and unvisited links
 4. Use graphics to show real content, not just to decorate your homepage
 5. Include a tag line that explicitly summarizes what the site or company does
 6. Include a short site description in the window title
 7. Don't use a heading to label the search area; instead use a "Search" button to the right of the box
 8. Don't include an active link to the homepage on the homepage

For each item above, discuss why you think this *is* or *is not* an important issue for web designers, using examples of real world web sites. Discuss two more issues not on the above list that you feel require attention, once again, using real world examples.

(10 marks)

4. (a) Consider the forms shown below:

FOOTBALL TEAM MANAGEMENT SYSTEM

Team Name	<input type="text"/>
Team Description	<input type="text"/>
Team Gender	Male <input type="radio"/> Female <input type="radio"/>
Preferred time(s) for competition	Spring <input type="checkbox"/> Summer <input type="checkbox"/> Autumn <input type="checkbox"/> Winter <input type="checkbox"/>
Number of registered players	0
<input type="button" value="Submit Team"/> <input type="button" value="Reset Team"/>	

Figure 4.1

FOOTBALL TEAM MANAGEMENT SYSTEM

Team Name	Drogheda Youths F.C.
Team Description	This team is composed of 9-11 year olds from the Drogheda area.
Team Gender	Male <input checked="" type="radio"/> Female <input type="radio"/>
Preferred time(s) for competition	Spring <input type="checkbox"/> Summer <input checked="" type="checkbox"/> Autumn <input checked="" type="checkbox"/> Winter <input type="checkbox"/>
Number of registered players	11-15
<input type="button" value="Submit Team"/> <input type="button" value="Reset Team"/>	

Figure 4.2

The form in Figure 4.1 is intended to be used by the Football Association of Ireland (FAI) to allow football clubs around Ireland register their teams for various competitions.

It is intended to be submitted to <http://www.fai.ie/register.pl> using HTTP GET.

- i. Provide the HTML code necessary to create this form (you may omit any code for creating tables etc.).
- ii. Show precisely the data that would be submitted to <http://www.fai.ie/register.pl> if the fields were filled in as shown in Figure 4.2.
- iii. When should you use the HTTP GET method in a form? Explain.
- iv. When should you use the HTTP POST method in a form? Explain.

(8 marks)

- (b) Show the changes necessary to your HTML from part (a), and provide the required JavaScript code to validate the form shown in Figure 4.1, so that it will only submit if:

- The name of the team is longer than three characters.
- The team description is not blank.
- A gender is selected.

In addition, if (and only if) **all four** preferred times for competition are selected, the user is asked to confirm that this is correct. If they say that this is not correct the form should not submit.

(7 marks)

Continued on the next page

- (c) Consider the two forms shown below:

FOOTBALL TEAM MANAGEMENT SYSTEM

Team Name	<input type="text"/>
Team Description	<input type="text"/>
Team Gender	Male <input type="radio"/> Female <input type="radio"/>
Preferred time(s) for competition	Spring <input type="checkbox"/> Summer <input type="checkbox"/> Autumn <input type="checkbox"/> Winter <input type="checkbox"/>
Number of registered players	0 <input type="text"/>
Players names	
<input type="button" value="Submit Team"/> <input type="button" value="Reset Team"/>	

Figure 4.3

FOOTBALL TEAM MANAGEMENT SYSTEM

Team Name	<input type="text"/>
Team Description	<input type="text"/>
Team Gender	Male <input type="radio"/> Female <input type="radio"/>
Preferred time(s) for competition	Spring <input type="checkbox"/> Summer <input type="checkbox"/> Autumn <input type="checkbox"/> Winter <input type="checkbox"/>
Number of registered players	1-5 <input type="text"/>
Players names	<input type="text" value="Enter player 1 name here"/> <input type="text" value="Enter player 2 name here"/> <input type="text" value="Enter player 3 name here"/> <input type="text" value="Enter player 4 name here"/> <input type="text" value="Enter player 5 name here"/>
<input type="button" value="Submit Team"/> <input type="button" value="Reset Team"/>	

Figure 4.4

Figure 4.3 shows a modified version of Figure 4.1, where an extra row has been added for “Players names”. The behaviour of the form has changed as well, so that when the number of registered players is *changed*, the correct number of boxes appears *dynamically*, allowing the user to enter the names, as shown in Figure 4.4.

Show how to implement this functionality using the Document Object Model (DOM) methods.

(10 marks)

5. (a) Compare and contrast *client side scripting* (e.g JavaScript), *server side scripting* (e.g. CGI) and *mobile code* (e.g. Java Applets). In your answer you should use diagrams to demonstrate how code is downloaded and executed, or executed remotely.

(9 marks)

- (b) Consider the following code:

```

<%@ page import="java.io.*,java.util.*" %>
<%
    out.print("<ul>");
    Enumeration paramNames = request.getParameterNames();
    while(paramNames.hasMoreElements()) {
        String name = (String)paramNames.nextElement();
        out.print("<li>" + name + " = ");
        String[] value = request.getParameterValues(name);
        String inputValue = value[0];
        out.println(inputValue);
    }
    out.print("</ul>");
%>
```

What language is the above code written in, and how does it receive its input?
What output would you expect if this code was executed? Explain.

(6 marks)

- (c) Consider the applet window and code below:

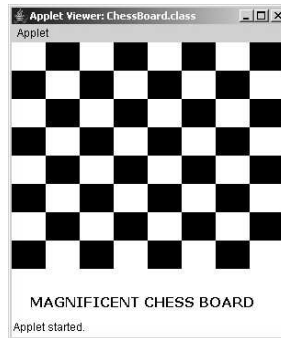


Figure 5.1

```

import java.applet.Applet; import java.awt.*;

public class ChessBoard extends Applet {

    private String message;

    public void init() {
        message = "MAGNIFICENT CHESS BOARD";
    }

    public void paint(Graphics g) {
        // get the width and height of the applet
        int appletWidth = getWidth();
        int appletHeight = getHeight() - 50;

        // each cell will be one eighth the width
        // and one eighth the height of the applet
        int squareWidth = appletWidth / 8;
        int squareHeight = appletHeight / 8;

        // colour the whole applet white
        g.setColor(Color.white);
        g.fillRect(0, 0, appletWidth, appletHeight);

        // colour every second square black
        g.setColor(Color.black);
        for(int i = 0; i < 8; i++)
            for(int j = 0; j < 8; j++)
                if(i % 2 != j % 2)
                    g.fillRect(i * squareWidth,
                               j * squareHeight,
                               squareWidth,
                               squareHeight);

        g.setFont(new Font("Verdana", Font.BOLD, 15));
        // draw the message to the applet window
        g.drawString(message, 20, appletHeight + 40);
    }
}

```

The Java code shown above produces the applet shown in Figure 5.1.

You are required to:

- Provide the HTML code needed to embed the applet into a HTML page.
- Explain why it is good practice, when writing applets, to import parameter values from HTML code.
- Show the modifications that are necessary to change the Java code and the HTML code so that the message drawn on the applet window can be read in as a parameter from the web page.
- Explain why compiled applet code is often archived into JAR or ZIP files.
- Show how the HTML code would need to be modified if the ChessBoard applet code was archived.

(10 marks)

6. (a) Compare and contrast *web browsing*, *instant messaging*, *e-mail* and *newsgroups* as means of communication over the Internet. In your answer you must describe the applications that are available for people who wish to use these services.

(8 marks)

- (b)
- The *World-Wide-Web* is a *client-server* system that runs over the *Internet*.
 - The architecture of World-Wide-Web applications is typically either *two-tier* or *three-tier*.
 - Internet hosts must be equipped with the *TCP/IP protocol suite* and can be uniquely identified by their *IP address* or their *host name + domain name*.

Explain each of the italicised terms in the context of the above three statements.

(9 marks)

- (c) Outline the security problems that are faced in using the modern Internet, and discuss how these problems are being tackled.

(8 marks)