OCR Computer Science A Level

1.3.4 Web Technologies

Intermediate Notes

Specification

1.3.4 a)

- HTML
- CSS
- JavaScript

1.3.4 b)

- Search engine indexing

1.3.4 c)

- PageRank algorithm

1.3.4 d)

- Server and Client side processing

Web Development

HTML

HTML is the language/script that web pages are written in. HTML allows a browser to interpret and render a webpage for the viewer by describing the structure and order of the webpage. The language uses tags written in angle brackets (<tag>, </tag>). There are two sections of a webpage: the body and the head. The head contains the title of the webpage and the body contains the content of the webpage.

HTML Tags

<html>	All code written within these tags is interpreted as HTML
<body>	Defines the content in the main browser content area
<link>	Used to link to a CSS stylesheet
<head>	Defines the browser tab or window heading area
<title>	Defines the text that appears with the tab or window heading area
<h1>, <h2>, <h3>	Heading styles in decreasing sizes
<p>	Paragraph separated with a line space above and below
<img>	Self closing image tag with parameters: img src=location, height=x, width =y
<a>	Anchor tag defining a hyperlink with location parameter link text)
	Defines an ordered list
	Defines an unordered list
	Defines an individual list item
	Divides a page into separate areas, each which can be referred to uniquely by name

Classes and Identifiers

Classes and identifiers are attributes given to elements on a webpage which you wish to style in a particular way.

Multiple elements across web pages can be assigned to a single class. This means elements can follow a consistent style, and the styling/ formatting only has to be defined once. This can be defined within the head of a web page, or within a linked CSS style sheet. Classes are defined using a full stop:

```
.example
```

Identifiers are a unique name given to an element on a web page. Whereas a class name can be used by multiple elements, only one element can be associated with a particular identifier. They are defined using a hashtag:

```
#example
```

CSS

Cascading style sheets (CSS) is a language which is used to describe the style of a webpage. CSS can be used to specify the way HTML elements look and can be applied to tags such as <h1>, <p> and .

CSS can be used in two different forms: internal/embedded CSS or external CSS. Internal/embedded CSS is placed inside the style tags and is entered directly into the HTML document. Meanwhile external CSS is written in a separate document and a link to this style sheet is added to the HTML document.

Whenever an external style sheet is used, the following link is added to the header:

```
<link href= "nameofstylesheet.css" rel= "stylesheet" type=
"text/css">
```

Each section of CSS begins with the name of the class/identifier or element to be styled, followed by a set of curly brackets within which the attributes of the element are defined.

```
body
{
     margin: 0px;
     background-color: white;
     font-family: Arial, Helvetica, sans-serif;
     font-size: 18px;
     text-align: center;
}
```

JavaScript

JavaScript is a scripting language which adds interactivity to websites. JavaScript is interpreted by the browser rather than compiled. Javascript is often used to validate input data on the client computer.

Advantages of using JavaScript:

- Local computer can deal with invalid data before it is sent off to the servers,
- Eases the load on busy servers
- Reduces web traffic

Inputs from HTML forms can be retrieved from a webpage and handled using JavaScript. Below are some uses of JavaScript you should be aware of:

Outputs

Changing the attributes of a HTML element:

```
chosenElement = document.getElementById("example");
chosenElement.innerHTML = "Hello World";
```

Writing directly to the document:

```
document.write("Hello World");
```

Displaying an alert box:

```
alert("Hello World");
```

Search Engine Indexing

Search Engines

A search engine is a program that searches through a database of internet addresses looking for resources based on criteria set by the client.

Search engines rely on an index of web pages. Web crawlers collect information about websites to build this index. They work by traversing the Internet, web page by web page using links on websites. The web crawlers collect keywords and phrases from the linked web pages and add this information to the index. They also collect and add meta data from websites, which is the information specified by the website owner.

PageRank Algorithm

The page rank algorithm ranks web pages, determining the order in which web pages are displayed when a search is conducted. Higher ranked pages will show up first.

There are two factors which determine the page rank of a page:

- How many incoming links it has from other web pages
- The page rank of the web pages that link to it

The data structure used to display this information is a directed graph. This shows which pages link to other websites, and webpages are represented as nodes while links between two pages are represented as arcs between the nodes.

Synoptic Link

Graphs can be used as **visual representations** of **complex relationships**.

Graphs are covered in **1.4.2** under **Data Structures and Graphs**

The pagerank algorithm is as follows:

$$PageRank(x) = (1-d) + d[(PageRank(T1) \div Count(T1)) + \ldots + (PageRank(Tn) \div Count(Tn)]$$

where *PageRank(x)* is the page rank of page *x*, *Count(Tn)* is the total count of outbound links from a webpage *n* and *d* is the damping factor. This is usually set to 0.85.

Server and Client Side Processing

Server side Processing

Server side processing is when a client sends data to a server for it to be processed. This means no information is processed on the client computer. Common server side scripting languages are SQL or PHP. Server side processing is useful for several reasons:

- Does not require plugins
- Can perform large calculations much faster than clients
- Not browser dependent,
- More secure

Client side Processing

Client side processing is when a client processes the data on a local device. This means that all of the information is processed on the client computer. This is also called client side scripting, and uses languages such as JavaScript. This is useful for the following reasons:

- Webpage can immediately respond to user actions
- Executes quickly
- Gives developers more control over the behaviour and look of the website