1. **HTML & Protocols**
   1. **HTML** 
      1. Draw the output from a Web Browser for this HTML code **and** explain how the HTML code is reflected in the output

2 marks

<html>

<head>

<title>sample page</title>

</head>

<body>

<table width="50%" border="1">

<tr>

<th rowspan="3">table head;</th>

<th>title1</th>

<th>title2</th>

<th>title3</th>

<th rowspan="2">title4</th>

</tr>

<tr>

<td>a</td>

<td colspan="2" rowspan="2">middle</td>

</tr>

<tr>

<td>c</td>

<td>d</td>

</tr>

</table>

<br />

<br />

<hr />

<blockquote>

<!--

X<sub>2</sub><sup>3</sup>+Y<sub>1</sub><sup>4</sup>

-->

<p>&lt;h2&gt;hello the world&lt;/h2&gt;</p>

</blockquote>

<hr />

<ol>

<li>HTML

<li>CGI

<li>Perl and PHP

</ol>

<hr />

<form action=" ">

<select name="partynumber">

<option>party 1</option>

<option>party 2</option>

<option>party 3</option>

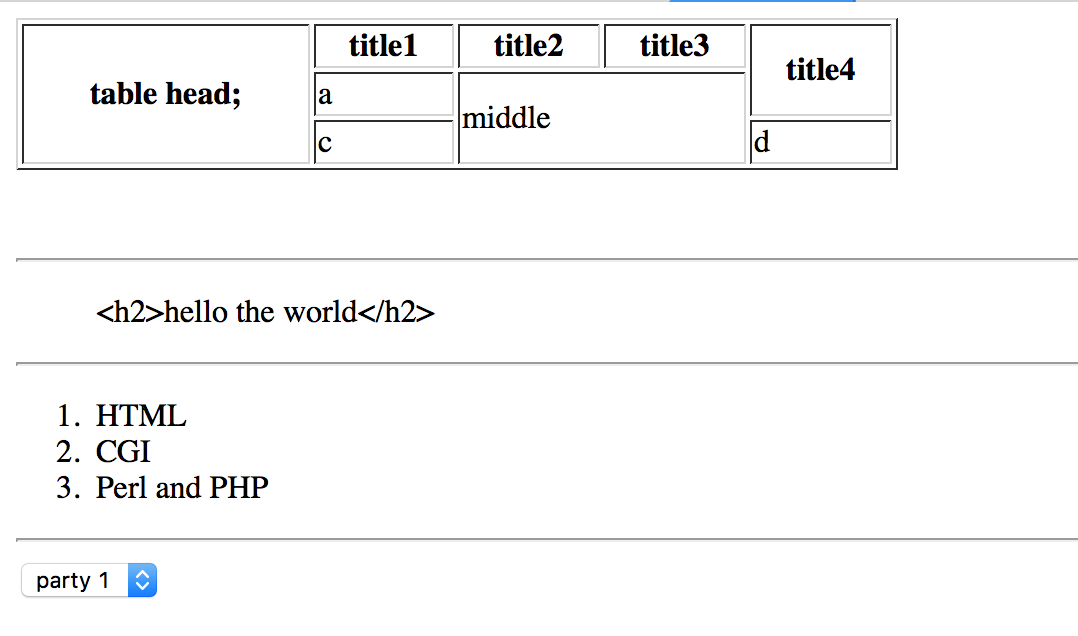
</select>

</form>

</body>

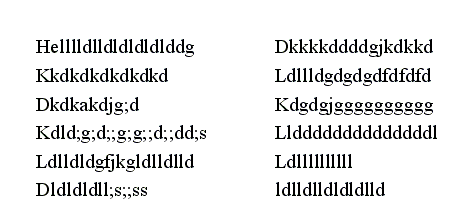
</html>

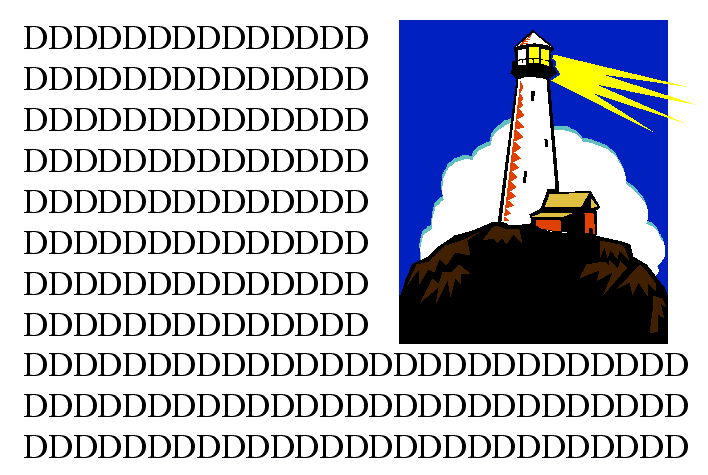
ANS



* + 1. What HTML tags and attributes could be used to create the following the web page layout?

2 marks





ANS:

<p style="float:left; width:50%"> … <br/> … </p>

<p style="float:right; width:50%"> … <br/> … </p>

<div style="clear:both">

<p>

<img src="…" style=”float:right”/>

text here

.</p>

</div>

* 1. **Hypertext Links**
     1. Answer these two questions :

8 marks

1. Explain the operational mechanism of Trackback
2. What is the problem of “**HTML dangling**”. Give the key point of the solution to this problem: Uniform Resource Name.
   * 1. Explain the following three URLs

3 marks

1. **http://vod.grids.cn/cgi-bin/clickfile?**

**dir1=science&dir2=computer&file=1.rm**

1. **http://162.105.203.19:5081/**
2. **ftp://y2003g0:pku123@162.105.203.19/**

ANS:

1 HTTP protocol webpage, hostname vod.grids.cn, is a cgi. Is using HTTP GET to submit a form with [key: value] of [dir1: science, dir2: computer, file: 1.rm]

2 IP 162.105.203.19, on port 5081

3 FTP protocol. User y2003g0, password: pku123 on host IP 162.105.203.19 (listening at port 20)

* + 1. A user inputs:

[**http://www.w3.org/protocols/HTTP-NG/Activity.html**](http://www.w3.org/protocols/HTTP-NG/Activity.html)

in the address blank of the Browser. The local DNS server is set to **202.112.7.13**. Describe (in detail) the steps from when the User hits the ENTER key until HTML page is displayed.

5 marks

ANS:

1 PC sends DNS request of [www.w3.org](http://www.w3.org) to the DNS server at 202.112.7.13. If DNS server has the mapped IP, it will return the IP (else will forward the request to other servers)

2 PC establishes TCP/TP connection using the IP address.

3 PC sends HTTP GET request for the required webpage

4 Server returns a HTTP response containing the HTML

5 Browser renders HTML

* 1. **Web Software Technology Overview**

The following are some Web Software technologies:

FastCGI PHP Servlet Javascript CGI ServerAPI

* + 1. Divide them into two groups, the first group are those run at the Client side, the second group include those run at Server side

1 mark

Client side: Javascript

Server side: FastCGI, CGI, PHP, Servlet, ServerAPI

* + 1. For the second group, rank all technologies in the order of performance from high to low and in the order of portability from high to low

2 marks

* + 1. Compared to PHP why is a CGI program said to be a lower performance environment?

1. marks

* For CGI programs, the HTTP server needs to create a brand new address space.
* For PHP programs, the interpreter of PHP is already embedded in the HTTP server.

1. **Perl, PHP and Database** 
   1. **Perl**
      1. In what two ways do single-quoted string literals differ from double-quoted string literals?

2 marks

if you put something in single quotation marks, Perl assumes that you want the exact characters you place between the marks - except for the slash-single quote (\') combination and double-slash (\\) combination. If you place text inside double quotation marks, however, Perl interprets variable names. Perl also interprets special characters inside double-quoted literal strings.

In a word:

1 Single-quoted strings do not recognise variable names.

2 Single-quoted strings do not recognise special characters, like \n and \t (it only recognises \’ and \\)

* + 1. In what fundamental way do Perl arrays differ from the arrays of other common high-level programming languages?

3 marks

* + 1. Explain the overall effect and method of operation of the following subroutine (you are *not* required to explain every line)

7 marks

**sub program{**

**local (\*in)=@\_if @\_;**

**local ($i,$loc,$key,$val);**

**if($ENV{'REQUEST\_METHOD'} eq "GET"){**

**$in=$ENV{'QUERY\_STRING'};**

**}elseif($ENV{'REQUEST\_METHOD'}eq"POST"){**

**read(STDIN,$in,$ENV{'CONTENT\_LENGTH'});**

**}**

**@in=split(/&/,$in);**

**foreach $i(0..$#in){**

**$in[$i]=~s/\+//g; #Convert +'s to spaces**

**($key,$val)=split(/=/,$in[$i],2);**

**#split into key and value**

**@key=~s/%(..)/pack("c",hex($1))/ge;**

**@val=~s/%(..)/pack("c",hex($1))/ge;**

**#Convert %XX from hex numbers to alphanumeric**

**@in{$key}.="\0" if (defined($in{$key}));**

**@in{$key}.=$val;**

**#Associate key and value**

**}**

**return 1;**

**}**

ANS: To parse the parameters passed to the script through the get/post methods into an array.

* 1. **PHP and Databases**
     1. How does a Web Server determine whether a requested document includes PHP code? What directive in the Apache configuration file is used to do this?

2 marks

By the file extension: .php, .php3 etc.

<FilesMatch “\.php$">

SetHandler application/x-httpd-php

</FilesMatch>

* + 1. How can a variable used outside a function be accessed by the function?

2 marks

* 1. global: define a variable outside the function, and access it inside by defining it again in the function (i.e. global $mysqli;). Using *global* keyword outside a function is not an error. It can be used if the file is included from inside a function
* 2. $GLOBALS: It is an associative array with the name of the global variable being the key and the contents of that variable being the value of the array element. They are available in all scopes throughout a script. There is no need to do global $variable; to access them within functions or methods.
  + 1. How can you define a variable in a function so that its lifetime extends beyond the time the function is in its first execution?

2 marks

static.

when a static variable is declared in a function, the same variable will be used again (its address space will not be deleted upon returning, and it will not lose its value). A static variable must be initialized upon definition, but it is initialized only in first call of function.

* + 1. How can a variable value be shared in different HTTP pages?

2 marks

Cookie, session

* + 1. How can the value of a form element be accessed by a PHP script?

2 marks

PHP creates a variable with the same name as the form element, and can be used directly. OR you can access form element values in super global arrays $\_POST and $\_GET. Key: element name; value: user input.

* + 1. Why is a Relational Database called Relational?

1. marks

ANS: because the data is stored in a set of formally-described tables. data can be accessed or reassembled in many different ways without having to reorganize the database tables, and depends on the relation of keys to for connections between the data.

1. **Java and JavaScript** 
   1. **Java**
      1. Explain and show how to use these language features which were added in Java 5:

* Generics
* Enhanced for loop
* Autoboxing/unboxing

6 marks

ANS:

Generics: Container<T>

Enhanced for-loop: for (T element in Container<T>) { doSth; }

Autoboxing: Integer newInt = 1 // automatically encapsulates a primitive type into a class. Java has a reference type for all primitive types, and most (?) can be autoboxed and unboxed within a range.

* + 1. Define these Java keywords and show how they might be used (in a code fragment):

10 marks

* + - * super
      * this
      * instanceof
      * implements
      * package

ANS:

this: points to the instance.

super: 指向这个对象的父类

instanceof: determines whether 一个被声明为父类的变量是否是某个子类对象

如果ClassA 和ClassB继承自IAmYourFather:

IAmYourFather sth = new ClassA();

boolean isA = sth instanceof ClassA;

boolean isB = sth instanceof ClassB;

则isA == true, isB == false

impements: 使得类实现一个接口，在定义类时使用：

class Snake implements CuteAnimals { … }

package: 相当于类的命名空间，一个package对应一个目录。在class文件最开头定义类所属的package.

* 1. **Javascript**
     1. Itemise specific uses of server-side JavaScript.

1. marks

Node.js = =

APE

MongoDB

* + 1. How, using Javascript, would you find the name (e.g Firefox or Netscape) and version of a web browser?

2 marks

Javascript browser sniffer.

* + 1. List the advantages and disadvantages of using JavaScript as a web software technology.

4 marks

* Pros
* - Executed on the client side; saves bandwidth and strain on the server.
* - A relatively easy language, and relatively fast to the end user. Simple.
* - No plugins required.
* - Extends functionality to web pages, achieves user interaction easily. Versatile.
* - Can directly operate on DOMs.
* Cons
* -  Security issues. Javascript snippets once appended will be executed and can be used to exploit the user’s system.
* -  Javascript rendering varies. Inconsistency.
* -  Users can disable javascript on their browser. Relies too much on the end user.

1. **Applets & XML**
   1. **Applets**
      1. There appears to be some confusion about the use of the <applet> tag versus the <object> tag to run Java applets. Discuss this issue – including the role of the HtmlConverter program.

10 marks

The <object> tag defines an embedded object within an HTML document. It is a theoretical unification that would be a catch-all for any embedding of external data. However, the specification is vague about how browsers should implement the object tag to support Java applets, and browser support is currently inconsistent.

The <applet> tag is specifically for running Java applets. Although it is deprecated in HTML 4.01, it is recommended by Sun to provide a relatively consistent deployment across browsers.

HTMLConverter was included with Java 1.4. You put a .class or .jar file into a folder and fire HTMLConverter (it's a Swing App) and the results was an HTML page with the applet tag, both as a code base and as a DOM object.

* + 1. When Java Applets are run in a Sandbox list four specific tasks that they are prevented from performing.

4 marks

ANS: (Copied from documentation)

1. They cannot access client resources such as the local filesystem, executable files, system clipboard, and printers.
2. They cannot connect to or retrieve resources from any third party server (any server other than the server it originated from).
3. They cannot load native libraries.
4. They cannot change the SecurityManager.
5. They cannot create a ClassLoader.
6. They cannot read certain system properties.
   1. **XML**
      1. Explain the purpose of namespaces and discuss how you might choose a suitable URI for a new namespace

2 marks

Namespaces are used to refer to the markup vocabulary that can be used in a

document.

An XML namespace is a collection of names that can be used as element or attribute names in an XML document. The namespace qualifies element names uniquely on the Web in order to avoid conflicts between elements with the same name. The namespace is identified by some Uniform Resource Identifier (URI), either a Uniform Resource Locator (URL), or a Uniform Resource Name (URN), but it doesn't matter what, if anything, it points to. URIs are used simply because they are globally unique across the Internet.

If it’s an entirely new namespace, choose something unique and clear to developers, preferably pointing to a path with your own hostname. It will prevent people from accidentally using your namespace.

If you are adding features to an existing XML language, follow this rule:

If the foo element in the namespace http://languagemainsite.org/lang/1.0/ is semantically a different concept to a foo element in the namespace http://languagemainsite.org/lang/1.1/, the namespaces should be different. If they're not—if a Lang-1.1 foo is just a Lang-1.0 foo maybe with a few extra features—they should be in the same namespace.

* + 1. Describe and compare DTDs and XML Schemas and indicate when each might be appropriate

5 marks

DTD:

A DTD defines the elements that may be included in your document, what attributes these elements have, and the ordering and nesting of the elements.

A DTD contains definitions in terms of elements and their attributes. We can only define an element as text, and with this limitation, it is not possible, for example, to force an element to be numeric. The main advantage of the DTD is that it provides validating parsers with a map of how to validate the XML document.

Schemas:

XML Schemas provide a much more powerful means by which to define your XML document structure and limitations. XML Schemas are themselves XML documents. They reference the XML Schema Namespace.

**XML Schemas provide an Object Oriented approach to defining the format of an XML document**. **XML Schemas provide a set of basic types**. The author of an XML Schema then uses these core types, along with various operators and modifiers, to create complex types of their own. These complex types are then used to define an element in the XML Document.

The only real drawback to schemas is that you may encounter a lag in applications that support them.

DTD vs. Schemas:

In Big Green Snake’s subtle opinion:

Always use schemas.

Unless your XML is extremely simple, and all data are strings.

But then again, if your data was that simple, I doubt you’d even use XML o\_O

* + 1. Define and explain these terms:

4 marks

* XSL-FO
* XSLT

ANS:

XSL-FO:

**XSL Formatting Objects**, or **XSL-FO**, is a markup language for XML document formatting which is most often used to generate PDFs. XSL-FO is part of XSL. XSL-FO was discontinued: its Working Group closed in November 2013.

**XSLT** (**Extensible Stylesheet Language Transformations**) is a language for transforming [XML](https://en.wikipedia.org/wiki/XML) documents into other XML documents, or other formats such as HTML for web pages, plain text or into XSL Formatting Objects, which may subsequently be converted to other formats, such as PDF, PostScript and PNG.

The original document is not changed; rather, a new document is created based on the content of an existing one.

**----**

**XSL-FO肯定不会考的 = = XSLT vs CSS 倒是也许会考**

CSS can manipulate the way your content looks in a document. But XSLT actually transforms one document into another.

**What CSS Can Do**

* Modify the font size, color, family, and style of text in markup
* Define the location and size of an element
* Change the background image and color of elements

Create a new look and feel for markup pages to display on the Web

**What CSS Cannot Do**

Change the order of elements in a document

Make computations based on the content of the document

Add content to the document

Combine multiple documents into one

**What XSLT Can Do**

convert data in a standard XML format to SQL statements, tab-delimited text files, or other database formats for data sharing

transform XSLT style sheets into new style sheets

turn Web pages (written in XHTML) to VoiceML or XHTML Basic for handheld devices

add CSS style sheets to XML documents for view in a browser