# 1. Describe three hardware and three software components that enable access to the web:

# 1.a Three Hardware Components

## Telephone Modem

A telephone modem is a device that converts the signals from your computer into a series of sounds and then transmits them across the phone line.

## Wired Network Interface Card (NIC)

Broadband connections provide much faster internet access than traditional narrowband connections such as dial-up modem connections. There are multiple types of broadband connection i.e. DSL, satellite and cable modem; each traditionally require the user to connect directly to the router via a wired network solution or a wireless network solution.

## Wireless Network Interface Card (NIC)

A Wireless NIC can be used to connect to a Wireless Access Point (WAP) to gain access to broadband from a DSL Modem, Cable Modem or shared Internet Connection. This type of connection sacrifices link stability and speed but provides greater mobility for mobile devices or when wired connections impractical.

# 1.b Three Software Components

## Web Browser

A web browser (commonly referred to as a browser) is a software application for retrieving, presenting and traversing information resources on the World Wide Web.

## Operating System

An operating system (OS) is software that manages computer hardware and software resources and provides common services for computer programs. This includes managing system resources to facilitate internet access.

## Transmission Control Protocol/Internet Protocol

TCP/IP is a two-layer internet protocol suite which allows access to the internet and similar computer networks. TCP/IP provides end-to-end connectivity specifying how data should be organised, transmitted and routed to its' destination.

# 2. Explain the role of the following:

## TCP/IP including IPv6

TCP/IP allows computers within a network, including the internet; to packet, address, transmit, route and receive data from one device to another. Part of this system involves the use of unique identifying numbers in the form of 'xxx.xxx.xxx.xxx'. These numbers allow any device to connect indirectly to any other device on a network such as an internal LAN or the internet. IPv6 was a more recent development which allocated a greater number of simultaneously unique device IP addresses which allows for further expansion of the internet, ensuring new devices still maintain a unique IP address.

## HTTP (Hyper-text transfer protocol)

The HTTP is an application protocol which forms the foundation of data communication for the World Wide Web (WWW). This protocol allows users to access and interact with, any content hosted on the World Wide Web using their web browser of choice. The client browser submits an HTTP request message to the server. The server, which provides resources such as HTML files and other content, performs functions on behalf of the client and returns a response message to the client. The response contains status information about the request and may also contain the requested content in its message body.

## SMTP (Simple Mail Transfer Protocol)

SMTP is an internet standard for e-mail transmission. It is a connection-oriented, text-based protocol in which a mail sender communicates with a mail receiver by issuing command strings and supplying necessary data over a reliable ordered data stream channel, typically a Transmission Control Protocol (TCP) connection. An SMTP session consists of commands originated by an SMTP client (the sender) and corresponding responses from the SMTP server (the receiver) so that the session is opened and data is exchanged.

# 3. Explain the role of the following:

## Internet Service Provider

An Internet Service Provider (ISP) allows a client device to connect to the internet or WWW through their internet backbone infrastructure. Traditionally this service begins at the user home or business and allows routing of all traffic to any IP of any website or device connected to the Internet.

## Domain Name Registrar

A domain name registrar allows users to register a unique ‘real-life’ word or phrase which is recognised as a particular IP address. This allows the owner of the website to make it easier for their clients to access the website as all that is required is remembering the website name rather than its’ particular IP address. E.g. [www.google.com](http://www.google.com) will bring the user to the same place as <http://216.58.211.164> but the written text is easier to remember. This service (redirecting a written word or phrase to a particular IP address) is handled by the Domain Name Registrar.

## Web Hosting Service

A Web Hosting Service is when a business, organisation or individual provides a service (traditionally for a fee) which stores a customer’s website on a server which is connected to the WWW through the internet. This allows anybody in any location to access this web-page and download any content from it.

# 4. Identify and briefly describe four types of website functionality:

Hypertext Links

Navigation Bar

Images

Text

# 5. Explain the use of two different Mark-Up Languages:

## HTML

**H**yper**T**ext **M**arkup **L**anguage (HTML) – the original markup language that was defined as a part of implementing the World Wide Web (WWW) is an ad hoc defined markup language which has inspired many others. HTML elements form the building blocks of all websites. It allows images and objects to be embedded to create interactive websites. It provides a means to create structured documents by denoting layout styles such as headings (<h1></h1>), paragraphs (<p></p>), lists (<ul></ul><ol></ol><li></li>) and other terms. It can be used to allow embedded elements written in languages such as JavaScript, PHP and MySql which can drastically affect the behaviour of HTML web pages.

## XML

Extensible Markup Language (XML) is a markup language that is widely used to create any tags needed (hence "extensible") and then describing those tags and their permitted uses. XML strikes a happy medium between simplicity and flexibility and has been rapidly adopted for many uses. Although the design of XML focuses on documents, it is widely used for the representation of arbitrary data structures such as those used in web services.

# 6. Explain the use and functionality of:

## Web runtime environments

A RunTime Environment (RTE) implements many of the basic behaviours of a computer language and allows it to be modified via an Application Program Interface (API) or embedded domain-specific language. A Web RunTime Environment is similar in that it uses a web based language such as Javascript, except utilising the core behaviour of the language but with the intention of availing of the mobility of web delivered content. The main use of web runtime environments is to allow a developer to produce content which can be utilised on multiple different platforms and operating systems (OS) remotely.

## Web application programming languages

Web site programming is the creation of applications or web pages that are used by a web browser. It allows others to interact with your web site and use the application on any computer with Internet access. The most popular web programming languages are: PHP, ASP.NET, Ruby on Rails, Perl, ASP classic, Python, and JSP. The primary use of web application programming languages is to allow a programmer to provide additional features to a website.

## Databases including SQL

A database is a collection of information that is organized so that it can easily be accessed, managed, and updated. Ordinarily, databases can be classified according to types of content: bibliographic, full-text, numeric, and images. The principal use of databases (including SQL) is usually provided in the form of a database management system (DBMS) which provides for the manipulation of data fields i.e. creation, editing and deletion of database elements.

## PHP

PHP is a server-side scripting language designed for web development. PHP code can be simply mixed with HTML code, or it can be used in combination with existing web frameworks. PHP code is usually processed by a PHP interpreter, which is traditionally implemented as a web server's native module or a Common Gateway Interface (CGI) executable.

# 7. Identify one typical stack combination that can be used for web development.

The typical stack of software used for web development will contain an operating system, Web server, database server, and programming language. One of the most well-known stacks used for web development is LAMP. LAMP stands for **L**inux **A**pache **M**ySql **P**HP.